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291

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[1] *No. 1, 1902, Biological Laboratory.*—Preliminary Report of the Appearance in the Philippine Islands of a Disease Clinically Resembling Glanders. By R. P. Strong, M. D.

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[1] *No. 3, 1903, Biological Laboratory.*—A Preliminary Report on Trypanosomiasis of Horses in the Philippine Islands. By W. E. Musgrave, M. D., and Norman E. Williamson.

[1] *No. 4, 1903, Serum Laboratory.*—Preliminary Report on the Study of Rinderpest of Cattle and Carabaos in the Philippine Islands. By James W. Jobling, M. D.

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[1] *No. 6, 1903.*—New and Noteworthy Plants, I. The American Element in the Philippine Flora. By Elmer D. Merrill, Botanist. (Issued January 20, 1904.)

[1] *No. 7, 1903, Chemical Laboratory.*—The Gutta Percha and Rubber of the Philippine Islands. By Penoyer L. Sherman, jr., Ph. D.

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[1] *No. 9, 1903, Biological and Serum Laboratories.*—A Report on Hæmorrhagic Septicæmia in Animals in the Philippine Islands. By Paul G. Woolley, M. D., and J. W. Jobling, M. D.

[1] *No. 10, 1903, Biological Laboratory.*—Two Cases of a Peculiar Form of Hand Infection (Due to an Organism Resembling the Koch-Weeks Bacillus). By John R. McDill, M. D., and Wm. B. Wherry, M. D.

[1] *No. 11, 1903, Biological Laboratory.*—Entomological Division, Bulletin No. 1: Preliminary Bulletin on Insects of the Cacao. (Prepared Especially for the Benefit of Farmers.) By Charles S. Banks, Entomologist.

[1] *No. 12, 1903, Biological Laboratory.*—Report on Some Pulmonary Lesions Produced by the Bacillus of Hæmorrhagic Septicæmia of Carabaos. By Paul G. Woolley, M. D.

No. 13, 1904, Biological Laboratory.—A Fatal Infection by a Hitherto Undescribed Chromogenic Bacterium: Bacillus Aureus Fœtidus. By Maximilian Herzog, M. D.

[1] *No. 14, 1904.—Serum Laboratory:* Texas Fever in the Philippine Islands and the Far East. By J. W. Jobling, M. D., and Paul G. Woolley, M. D. *Biological Laboratory:* Entomological Division, Bulletin No. 2: The Australian Tick (Boophilus Australis Fuller) in the Philippine Islands. By Charles S. Banks, Entomologist.

No. 15, 1904, Biological and Serum Laboratories.—Report on Bacillus Violaceus Manilæ: A Pathogenic Micro-Organism. By Paul G. Woolley, M. D.

[1] *No. 16, 1904, Biological Laboratory.*—Protective Inoculation Against Asiatic Cholera: An Experimental Study. By Richard P. Strong, M. D.

No. 17, 1904.—New or Noteworthy Philippine Plants, II. By Elmer D. Merrill, Botanist.

[1] *No. 18, 1904, Biological Laboratory.*—I. Amebas: Their Cultivation and Etiologic Significance. By W. E. Musgrave, M. D., and Moses T. Clegg. II. The Treatment of Intestinal Amœbiasis (Amœbic Dysentery) in the Tropics. By W. E. Musgrave, M. D.

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[1] *No. 23, 1904, Biological Laboratory.*—Plague: Bacteriology, Morbid Anatomy, and Histopathology (Including a Consideration of Insects as Plague Carriers). By Maximilian Herzog, M. D.

No. 24, 1904, Biological Laboratory.—Glanders: Its Diagnosis and Prevention (Together with a Report on Two Cases of Human Glanders Occurring in Manila and Some Notes on the Bacteriology and Polymorphism of Bacterium Mallei). By William B. Wherry, M. D.

No. 25, 1904.[2]—Birds from the Islands of Romblon, Sibuyan, and Cresta de Gallo. By Richard C. McGregor.

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No. 30, 1905, Chemical Laboratory.—I. Autocalytic Decomposition of Silver Oxide. II. Hydration in Solution. By Gilbert N. Lewis, Ph. D.

No. 31, 1905, Biological Laboratory.—I. Notes on a Case of Hæmatochyluria (Together with Some Observations on the Morphology of the Embryo Nematode, Filaria Nocturna). By William B. Wherry, M. D., and John R. McDill, M. D., Manila, P. I. II. A Search Into the Nitrate and Nitrite Content of Witte's "Peptone," with Special Reference to Its Influence on the Demonstration of the Indol and Cholera-Red Reactions. By William B. Wherry, M. D.

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[1] Out of print.

[2] The first four bulletins in the ornithological series were published by the Ethnological Survey under the title "Bulletins of the Philippine Museum." Later ornithological publications of the Government appeared as publications of the Bureau of Government Laboratories.

(Concluded on third page of cover.)

THE PHILIPPINE

JOURNAL OF SCIENCE

B. MEDICAL SCIENCES

VOL. III SEPTEMBER, 1908 No. 4

HEALTH CONDITIONS IN THE PHILIPPINES.[1]

By WILLIAM S. WASHBURN.[2]

The health conditions of any locality or country are only relative at best and not absolute. The opposite state to that of health is disease, the principal causative factors of which are microörganisms, myriads of which surround us as unseen friends or foes. The maintenance of health appears to be dependent principally on an environment favorable to normal growth and development. It is now realized that the observance of the laws of personal, domestic, and public hygiene is the best protection against the invasion of the agencies of disease. Ignorance of these laws destroyed the health or lives of nearly 100,000 Spanish soldiers in Cuba in three years; and in the civil war, for every man killed by bullets there were two who died, and probably five whose health was permanently destroyed by camp diseases which are now known to be preventable.

Instances of this character were formerly frequent and were not confined to military operations in the tropics; it is certain that such appalling death rates could have been greatly reduced by the intelligent application of modern sanitary measures. It would appear that the loss of Spain's tropical possessions is partly attributable to her failure to cope successfully with the lurking enemy, disease.

Under American administration, however, as early as 1903, the Surgeon-General of the United States Army was able to state that the admission rate in Cuba and Porto Rico of 1,300.24 per thousand and a death rate of only 6.72 per thousand indicated that the troops on those islands were as healthy as the Army at home in the United States during the decade 1888 to 1897, prior to the Spanish-American war, when sickness and mortality were the lowest recorded. It appears from the records that during the last five years of the decade, now nearly completed, of American occupation of the Philippines, the Army in the United States proper has reached an almost unprecedented state of health, measured by the death rate from all causes for the year 1906 of 5.28 and a rate from disease of 2.84, the lowest recorded, as against the death rate of 6.72 for all causes for the decade prior to the Spanish-American war, when no troops were in the Tropics. A death rate of 5.61 for 1905 was reported in the British army. The discharge, death, and total loss rates were lower in Cuba for the last three months of 1906—during which time American troops were again stationed in Cuba—than in any other country where American troops were serving, including the United States. Since the days of Spanish occupation yellow fever, the scourge of the Spanish army, has become nonexistent in Cuba and Porto Rico.

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[1] Read at the Fifth Annual Meeting of the Philippine Islands Medical Association, February 29, 1908.

[2] Director of Civil Service, Philippine Islands.

It is my purpose to give a brief review of the advances made by the American Government toward better health conditions in the Philippines, and to indicate, though quite cursorily, the comparative health conditions at the present time, as shown by records and reports. In July, 1901, military government in the Philippines was formally succeeded by civil government. Until the spring of 1905 the health department was under the immediate charge of officers detailed from the Medical Department of the Army, and thereafter has been under the immediate direction of a medical officer of the United States Public Health and Marine-Hospital Service. The health phase of civil government responsibility has therefore been continuously under the immediate direction of men well trained in matters of public health and sanitation, who have carried on the work so well begun under the military régime and subsequently so faithfully supported in times of stress by the Medical Corps of the United States Army and the Public Health and Marine-Hospital Service in the fight against disease.

When the marines and troops were landed in Cavite and Manila in 1898, these places were described as being filthy in the extreme. Other cities and towns in the Archipelago were subsequently found to be also generally insanitary and unsuitable for occupation. For three years the work of sanitation was carried on under the military government, during which period the troops were for the most part engaged in active operations in the field, necessitating exposure frequently to all manner of disease and rendering difficult the observance of the laws of hygiene. Notwithstanding such adverse conditions, the chief surgeon of the Philippines Division reached the conclusion in July, 1900, that the relatively small percentage of sick in the army in the Philippines was largely due to the care and attention given by officers and men to sanitation; that increased appreciation on their part of its beneficial result to health and consequent increased efforts to carry out its rules with thoroughness, would result in a further diminution of the sick report; and that, roughly stated, one-half of the sickness in the Army could have been prevented if everybody had obeyed the sanitary recommendations of the medical officers.

> In 1902 "The greatest noneffectiveness from disease and injury in the United States was reported in January, February, and March, during which the sick report of troops at home was larger than in the Pacific islands. In March the cholera epidemic began in Manila and the island rates began at once to increase, the greatest number of admissions and the highest monthly mortality being reported in July of that year."[3]

The value of the application of sanitary science and its influence on health conditions is shown by the decrease in the death rate and admissions to sick report per thousand among American troops in the Philippines from certain diseases, as follows:

Diseases.	1898.		1899.		1906.	
	Death rate.	Admissions.	Death rate.	Admissions.	Death rate.	Admissions.
Typhoid fever	7.58	68.21			0.00	3.88
Undetermined fevers	0.00	63.04			0.00	8.97
Malarial fevers			1.23	705.49	0.55	304.20
Tuberculosis			1.18	5.54	0.79	5.49
Diarrhœal diseases			6.11	748.59	0.40	174.55
Insanity	0.34	2.07			0.00	2.02
Venereal diseases					0.08	310.84

The statistics for the year 1907 show a marked further decrease for nearly all diseases in admission, death, and noneffective rates in the Philippines and in the number of sick invalided home from the Philippines for that year.

The mortality rate for the year 1906 of American troops in the Philippines was much lower than that of the native troops for every disease except tuberculosis, which caused 17.5 per cent of all American deaths from disease,[4] as against 6.66 per cent of all deaths from disease among the native troops, but the discharge rate for tuberculosis was only 27.10 per cent of the total discharges because of disease among the American troops as against 51.06 per cent for this infection among native troops, thus probably making the actual death rate from this disease, if those who died after discharge are included, greater among the native troops than among the American. One-seventh of the deaths in Manila are due to tuberculosis. The relative death rate because of tuberculosis in the Army serving in the United States was 0.78, as against 0.79 for American troops in the Philippines. The mortality rates of native troops in the Philippines were 2.58 per thousand from injuries and 8.93 from disease, 4.55 of which was due to beri-beri, Asiatic cholera, and malarial fever, all preventable, and 4.37 to other diseases.

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[3] Report of the Surgeon-General, United States Army, for year ended June 30, 1903.

[4] The statistics for 1906 on death and discharge rates of American troops serving in the Philippines include the number of those who were invalided to the United States, died, or were discharged.

For the year 1907 the mortality rate from all causes (diseases and injuries) of American troops in the Philippines was 5.92. The death rate among the native troops from disease was 5.06, while the rate among American troops from disease was only 3.61. The deaths among American troops in the Philippines from injuries were 39 per cent of their total mortality (fourteen men having been drowned, the same number as in the preceding year), the fatalities from disease being only 61 per cent of the total mortality. In 1906 over 50 per cent of the deaths among troops serving in the Philippines were due to injuries. Deaths from disease on account of service in the Philippines therefore appear to be approaching the low mortality rate from disease for the army in the United States.

For 1906 the admission to sick report rate for the army in the United States was 1,179.93 per thousand; in the Dutch army for 1903 the admission rate was 1,321 per thousand. The admission rate in the Philippines for the calendar year 1907 was 1,401. The average duration of each case in the Philippines was twelve days.

The following is an interesting comparative exhibit on the causes of ill health of American troops serving in the United States and in the Philippines: For 1906 in the Philippines the noneffective relative rates were, respectively, for venereal diseases 22.04, malarial fevers 6.39, diarrhœal diseases 5.49, and dengue 1.69—the noneffectiveness on account of venereal disease being nearly double the total of the other three named and more than double that of the army in the United States from this cause.

> "Of the 1,364 men discharged for disability in the United States, over 64 per cent were for disabilities not incurred in the line of duty, and of these, 51 per cent were contracted before enlistment. The principal causes of discharge, with the number for each cause, were: tuberculosis 140; venereal diseases 165; defective vision 141; defective hearing 90; and organic disease of the heart 71."[5]

Of 181 discharges of American troops serving in the Philippines in the year 1906, 38 were for causes existing *previous* to service in the Philippines, 22 or 15.4 per cent for causes *not* originating in the line of duty, 33 on account of *injuries* received in the line of duty, and 3 not in the line of duty, and the remaining, only 85, or 47 per cent of the total number discharged, from diseases incurred because of service in the Philippines and in the line of duty.

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[5] Report of the Surgeon-General, United States Army, for year ended June 30, 1907.

The chief surgeon of the Philippines Division, in his report covering 1907, states that "The number of days lost not incident to the service was 85,062 for the American troops," as against 156,267 days lost incident to the service, and in further comment says:

> "The very large proportion of total nonefficiency from sickness due to causes not incident to the service is the occasion of great solicitude to the authorities of the division, and active efforts are being made to reduce it. Could such be eliminated the health of the troops in the Archipelago would compare favorably with that of the army in the United States. Of these causes venereal diseases are by far the most important. * * * Eliminate malarial diseases and our admission rate per thousand per annum would be 1,192. Eliminate venereal diseases and the rate would be 1,178. Eliminate them both and the rate would be 969, or for sickness alone 764 per thousand, a rate unequaled in our territory except in Alaska. I should be glad to see this reached and have no doubt it can be if the suggested means are zealously employed."

Even by the strictest isolation of infected soldiers it will be difficult for the military authorities to reduce venereal disease so long as infected women near military posts are not also isolated. The responsibility for their isolation rests with the civil and not the military authorities.

Referring to malarial fever the Surgeon-General in his report issued in 1906 states: "This increase in a disease which is entirely preventable, and which last year caused seven deaths and an immense amount of noneffectiveness, should cause serious consideration as to the sufficiency of the preventive measures heretofore taken." The natives suffered more severely than the Americans from malarial fevers, but appeared to be less affected by diarrhœal diseases.

It was formerly thought that "natives of the Philippines eat and drink with comparative impunity articles of food and foul water, the use of which by white men is disastrous." They certainly have no such immunity to cholera, and the reports on autopsies and investigations made here by Gilman, of the Philippine Medical School and Bureau of Science, and by medical officers of the Army indicate that the natives do not possess the heretofore supposed immunity against intestinal parasitic diseases.

During the calendar year 1906 there were only forty-eight admissions and no deaths from typhoid fever among American soldiers in the Philippines. There was one death from this disease among the native troops. The death rate per thousand from this disease in the army in the United States was 0.28.

Comment is made upon an outbreak of beri-beri among the Filipinos at the Louisiana Purchase Exposition, the only epidemic of this disease which has been reported in the United States. There were 59 cases, with four deaths, among the Filipinos. No other people were affected. The points of interest were the entire escape of 450 Filipino Scouts, who were living in a model camp under the best sanitary conditions, and of 38 other Filipinos whose sanitary surroundings were good, while all of the cases occurred among the remaining 788 natives, who were for some time crowded into one small building under conditions of filth, bad ventilation, and extreme overcrowding. There were in this building twelve bunks for as many people in each room 10 by 12 feet. After the overcrowding and other insanitary conditions were removed, the disease ceased. Food as a factor could be excluded, because all the Filipinos—those who escaped entirely, like the Scouts, and those severely affected—had practically the same diet and a liberal one. A good quality of Louisiana rice was used by all.

As to the influence of race, the comparative records, all facts considered, do not seem to warrant the conclusion that colored and native troops are more resistant than white soldiers to the effects of tropical service. The death rates from all causes and from disease alone are highest among the Filipinos. While other rates are lower for the natives, it is to be borne in mind that American soldiers excused from any portion of their military duty, no matter how trivial the cause, are placed on sick report, which is not the case with native troops. "During the cholera epidemic in 1902 the admission and death rates for native troops greatly exceeded those of white soldiers, although the American negroes were the greatest sufferers of all." According to statistics the physique of the average colored soldier when enlisted is superior to that of the average white soldier.

The diseases more prevalent in the Philippines among the American troops in 1906, with the admission rate per thousand for each, are shown in the following comparative table:

Disease.	American troops.			Filipino troops.
	Total.	White.	Colored.	
Venereal diseases	310.34	309.17	322.27	63.25
Diarrhœa, including enteritis	130.69	130.63	131.96	95.40
Dengue	88.77	85.52	149.44	15.55
Dysentery	43.86	41.61	85.86	20.38
Dyspepsia	35.46	33.79	66.77	27.53
Alcoholism	30.37	31.57	7.95	.63
Articular rheumatism, acute and chronic	11.39	11.15	15.90	5.46
Diseases of the liver	6.54	6.73	3.18	1.89
Appendicitis	5.41	5.36	6.36	1.26
Measles	5.01	5.28		.63
Typhoid fever	3.88	4.08		.84
Heart disease, organic, including endocarditis and pericarditis	2.26	2.22	3.18	2.10
Insanity	2.02	2.13		.63

The diseases more prevalent among the Filipino troops are shown in the following table:

Disease.	Filipino troops.	American troops.		
		Total.	White.	Colored.
Malarial fevers	393.15	304.20	318.10	44.52
Bronchitis, acute and chronic	67.03	27.30	25.95	52.46
Abscess, acute	44.76	35.95	35.06	52.47
Constipation	44.76	22.54	20.68	57.24
Dhobie itch	43.08	27.54	24.97	76.31
Beri-beri	36.98	.08	.09	--------
Fevers, undetermined	21.43	8.97	8.68	14.31
Conjunctivitis, acute	16.18	7.92	7.74	11.13
Tuberculosis	9.88	5.49	5.36	7.95
Cholera, Asiatic	2.73	.57	.60	--------
Pneumonia	1.68	.48	.51	--------

While "the rates for white soldiers serving in the Philippines exceeded those for colored troops under similar conditions in all cases except in point of admission to sick report, the respective admission, discharge, death, and noneffective rates being 1,675.18, 11.86, 9.42, and 63.66 for white troops, and 2,170.11, 2.71, 4.07, and 57.53 for the colored soldiers," it is noted that at the same time with respect to the troops serving in the United States "as usual, all rates for colored troops, except the death rate, were considerably lower than those for white soldiers. The admission, discharge for disability, death, and noneffective rates for colored troops from all causes were 884.32, 16.22, 10.68, and 37.35, respectively, compared with 1,199.16, 33.32, 4.94, and 47.55, the corresponding figures for white troops." The rates for admission, discharge, and constant noneffectiveness in the United States were better for colored than for white troops, but the death rate among the colored troops was nearly two and a half times that of white troops, being greater in almost all classes of diseases, especially so in diseases of the respiratory, digestive, and circulatory systems. "The rate for tuberculosis was more than four times as great, and for pneumonia more than tenfold. It is noticeable that while there were *twenty-two* deaths from drowning among the white troops, there were none among the colored."

This fact materially reduces the relative rate among white troops from disease.[6]

With reference to the influence of length of service of American troops in the Philippines, statistics for 1906 show the highest admission and noneffective rates during the first and second years of service, the lowest death rate during the second and third years of service, the lowest admission and noneffective rates during the third and fourth years of service, and the lowest discharge rates during the fourth and fifth years of service.

Considering the physical condition of recruits, the relatively high rates of admission, noneffectiveness, and deaths on account of injuries, the large percentage of diseases not incurred in the line of duty and not attributable to service, and the comparative immunity from certain contagious, infectious, and frequently uncontrollable diseases incident to residence in the United States, it does not appear that health conditions in the Philippines are *necessarily* unfavorable to American troops serving in the Philippines compared with service in the United States.

Let us now turn to a brief review of the comparative state of the general public health in the Philippines. Quoting from the first paragraph of the last annual report of the Director of Health: "The effect of the sanitary reforms which have been persistently carried out during the past few years commenced to show in a most concrete and substantial manner during the period covered by this report. The public health has been more satisfactory than at any time since American occupation of the Philippines, from which it is reasonable to infer that health conditions are better now than at any time for the past one hundred years or

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[6] The relative prevalence of certain special diseases among white and colored troops in the United States, with the admission rates per thousand for each, are shown in the following table:

Special diseases.	White.	Colored.
Venereal diseases	159.47	150.34
Tonsilitis	60.23	33.45
Bronchitis, acute and chronic	49.71	22.17
Diarrhœa, including enteritis	75.56	44.74
Malaria	52.20	20.56
Influenza	23.02	21.77
Muscular rheumatism and myalgia	31.93	39.50
Hæmorrhoids	7.89	16.58
Rheumatism, subacute and chronic	7.05	9.67
Measles	6.74	0.40
Dysentery	6.14	3.22
Tuberculosis	4.96	9.27
Typhoid fever	6.00	0.40
Pneumonia	2.20	4.48
Frostbite and freezing	0.71	4.43
Smallpox	.16	2.42

more. The death rate per thousand for the city of Manila has been reduced from 40.99 last year to 36.91; the rate for Americans being 5.59, which is a reduction of 3.75 over the previous year, and among Spaniards the rate dropped from 17.40 to 15.84."

It is expected that the death rate per thousand for the city of Manila for the current fiscal year will be reduced to 30 or below. For comparison, the death rates in the following cities and countries as shown by the last census and subsequent reports were as follows: *Cities*—Cairo, 1907, Egyptians 38.4, foreigners 27.4; Bombay, for three-fourths of the year 1903, Hindus 86.06, Mussulmen 77.21, Parsees 31.17, Europeans 16.73; Calcutta 37; Batavia 46; Madrid 32.1; Barcelona 30.7; Shreveport 45.5; Savannah 34.3; Nashville 39.7; St. Petersburg 31.1; Richmond 29.7; New Orleans 29.9; Washington, D. C., 22.8; Boston 20.1. *Countries*—Hungary 27; Austria 25; Italy 22.1; German Empire 21.5; France 21.1; United States 17.8; Switzerland 17.3.

At the time of American occupation of the Philippines, the principles of modern sanitary science were not applied. Habitations and other buildings were unclean and insanitary and frequently set in unhealthful surroundings. The people were not being instructed in personal and domestic hygiene. The mortality of infants under one year of age among the natives is shown to have exceeded "the combined mortality of Asiatic cholera, bubonic plague, smallpox, dysentery, malarial fever, typhoid fever, and beri-beri." What wonder that the mortality rates of natives were high and are still excessive?

The English-speaking population in Manila does not include the usual proportion of old and young persons, and some have returned to the homeland because of illness, which, however, from the best information obtainable, has rarely resulted in death. The death rate, 15.84, among the Spanish population in Manila, which is generally composed of the usual members of families, is lower than in the United States according to the last census and gives a fair basis of comparison of health conditions in Manila.

A striking illustration of the value of the persistent and thorough application of proper sanitary measures is the reduction of the mortality rate in Bilibid Prison from over 100 per thousand in 1905 to 20 per thousand toward the close of the fiscal year 1907. The number of deaths in Bilibid was formerly enormous, the number during the last fiscal year being less than one-half of that for the preceding year. Pneumonia has been epidemic in this institution.

Misleading articles[7] on the unhealthfulness of the Philippines written after returning to the United States by Doctor Louis H. Fales, a former physician-in-charge of the medical work in Bilibid Prison, appear to find their own refutation in the greatly reduced mortality rates under the application of proper sanitary measures. Unable[8] himself to apply successfully the principles of sanitary science, all his writings in medical journals in the United States have been colored by his own unhappy experiences in the Philippines.

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[7] The American Physician in the Philippine Civil Service. *Amer. Med.* (1905), 9, 513. Tropical Neurasthenia and its Relation to Tropical Acclimation. *Amer. Journal Med. Sciences* (1907), 133, 582.

During the last fiscal year there were treated in the Civil Hospital in the city of Manila "1,310 patients, of whom 818 were white people, 463 Filipinos, and 29 Chinese, Japanese, and other Asiatics. Of this number of patients only 29 deaths occurred, 3 being patients of outside physicians. As 8 of the deaths were those of patients brought to the hospital in a moribund condition, they may properly be excluded from the number of deaths in the institution. On this basis the death rate would be less than 1½ per cent of the cases treated."

The inadequacy and unsuitableness of the building used for several years past as a civil hospital are in part compensated for by the efficiency and devotion to duty of the medical and nursing staff of the hospital.

The last United States census reports show the average urban death rate in the United States as 18.6 and the rural death rate 15.4, or a difference of 3.2 in favor of the rural communities. Statistics are not available showing definitely the mortality rates in the Philippines outside of Manila. It is probable that any difference here is likewise in favor of the Archipelago outside of Manila, where practical application of sanitary measures has accomplished much through the hard work and guidance of the few available medical inspectors of the Bureau of Health, the Medical Corps of the Army at Army posts and the American teachers, several hundred in number, stationed in the *pueblos* throughout the Islands. No small measure of credit is due the teachers for their splendid, often heroic, work in combating disease and improving the sanitary conditions of the *pueblos* in which they have been stationed. Having the confidence of the people, they have been able to aid materially in applying the sanitary regulations of the Bureau of Health through instruction in schools and by giving wholesome advice to local authorities.

The health of American teachers of the Bureau of Education, distributed as they are all over the Archipelago, is probably a fair indication of the general health of English-speaking civilians in the Philippines who have avoided excesses and lived normal lives since coming to the Islands. There were during the past year approximately 800 American teachers in the Islands; there have been in former years upwards of 900, nearly one-third of whom have been women. In his last annual report the Director of Education states: "The statistics for the past year show an average of but six days' illness for each American teacher in the service. The general health of the force is excellent. So far as we have been able to determine, teachers enjoy on the average as good health here as in the United States, and our experience shows more conclusively every year that the teacher who takes reasonable care of himself has no cause to dread the effects of this climate."

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[8] It is proper to state that Dr. Fales was seriously handicapped as was his successor, in not being free to carry out sanitary measures properly. Since November 1, 1905, the Bureau of Health has had control and supervision of sanitation in prisons in the Philippines, the physician charged with the care of the health of prisoners at Bilibid being responsible to the Director of Health.

For the years 1902 to 1907, inclusive, the total number of American teachers who died in the Philippines or in the United States because of illness contracted in the Philippines is 60. The first considerable number of teachers, 600, arrived in the Islands in August, 1901, in which year one death occurred within a few days after arrival in the Islands, the cause being nephritis (probably chronic). There has been one death during the present calendar year from violence, making 62 in all. Sixteen deaths resulted from injuries or violence, the remaining 46 from diseases as follows: smallpox 11, cholera 9, dysentery 7, typhoid fever 3, tuberculosis 3, nephritis 3, one each from encephalitis, cerebral hæmorrhage, cerebral meningitis, pneumonia, diphtheria, abortion, heart disease, hepatic abscess, and two unknown. There were no deaths from malarial fever and diseases not incident to duty, which so seriously interfere with the health and efficiency of soldiers. Malarial fever was the cause, next to tuberculosis, of the highest death rate during the year 1906 among the American troops in the Philippines. Comparative freedom from these diseases accounts in a measure for the comparatively low sick and death rates among teachers.

The number of deaths by years was as follows: In 1901, one; 1902, sixteen; 1903, sixteen; 1904, nine; 1905, seven; 1906, seven; and 1907, five. The larger number of deaths during 1902 and 1903 is accounted for partly by the fact that teachers appointed prior to 1904 were not subjected to thorough physical examination before appointment, and partly by unfavorable conditions of living in the Philippines in the early years of American occupation. There were twenty deaths from smallpox and cholera, all of which save three from smallpox, occurred prior to 1904. Some teachers came to the Islands during 1901, 1902, and 1903 who were in ill health in the United States, hoping that the change of climate would be beneficial. It is a fact that the health of many of these was improved and maintained during their stay in the Islands.

These statistics are fairly indicative of the effectiveness of the application of prophylactic and hygienic measures and of the general health of Americans throughout the Islands. Deaths among the white population of the Philippines from smallpox and Asiatic cholera are now happily rare, and the illness and mortality from those obstinate diseases which prevail in the United States, such as pneumonia (the second in mortality rate in the United States), influenza, typhoid fever, diphtheria, measles, and scarlet fever is comparatively small.

With few exceptions the statistics of each succeeding year show a steady decrease throughout the Islands of the inroads made by dangerous communicable diseases.

Tuberculosis remains in the Philippines as well as in all other countries, the "great white plague" among all races of people, and takes front rank here among "dangerous communicable diseases." During the past year one-seventh of the deaths in Manila were due to this cause. Preventable with difficulty, it is far more serious in the Philippines than all of the so-called tropical diseases combined, including Asiatic cholera and bubonic plague. A bulletin on tuberculosis, prepared by the Bureau of Health, showing how the disease is communicated and urging prophylactic measures, has been widely distributed during the past year and is being taught in the public schools.

There appears to be a greater abatement among civilians than among soldiers of diseases due to intestinal parasites. Intestinal diseases due to parasites are positively known to be preventable by the exercise of sufficient care in eating and drinking. Fortunately, too, the great majority of cases yield to treatment. There is reason to believe that in the near future intestinal parasites, through the achievements of preventive medicine, may cease to be important factors in producing intestinal diseases. This accomplishment will be almost as much of a boon to the tropics as was the discovery of the means of preventing yellow fever.

Bubonic plague has disappeared from the Islands, no case having been reported for nearly two years. During the fiscal year ended June 30, 1903, there were 160 cases, for the fiscal year 1904, 94 cases, for the fiscal year 1905, 41 cases, and for the fiscal year 1906, 20 cases. Less fortunate are the Asiatic cities on the China Sea, where cases are frequently reported, and in India, where over 1,000,000 of the inhabitants are dying annually from this disease.

There is now in the Philippines much less smallpox than for many years past, a direct result of the thorough and extensive campaign of vaccination. Since the completion of the vaccination not a single death from smallpox has been reported in several provinces where formerly thousands died annually. During the last fiscal year 2,022,380 persons were vaccinated, an increase of 1,072,255 over the preceding year. Of three and one-half million persons vaccinated, one and one-third millions were reported as successful vaccinations. Not one case of loss of life or limb, and not one of serious infection has been reported. This record is conclusive evidence of the care with which vaccine is prepared at the Bureau of Science, and also, of the rigidness with which the instructions for performing vaccinations are carried out.

The working out of the leprosy problem has reached a stage which practically insures its final and complete solution. The segregating of the lepers from the rest of the inhabitants of the Philippines as a leper colony on the island of Culion has resulted in clearing all of the Islands, except a portion of Luzon, of persons known to the health authorities to be leprous and in already reducing the number from approximately 4,000 to somewhat more than 3,000. The constant withdrawal of leprous persons from among the inhabitants of the Islands reduces to a minimum the chances of infection. The presence of this loathsome disease, except an occasional case, must be practically limited by the lives of those assembled at Culion. Only one American and one European are known to have developed leprosy during the decade of American occupation of the Philippines.

While living in the Tropics is generally supposed to be detrimental to the health of white people as compared with people of the dark races, statistics show that in Manila, Bombay, Cairo, and other cities situated in the Tropics or subtropics there is a wide difference in favor of the white race between the death rates of foreigners and natives.

All the ills to which flesh is heir have been attributed in the Philippines to the tropical climate. There is no intention in this paper to discuss the climatic phase of health conditions in the Philippines. In a paper[9] on the relation between climate and health which I presented at a meeting of this association three years ago, among others the conclusion was reached that failures of people of the white race to live in the Tropics and maintain health, excluding localities characterized by excessive heat, high relative humidity, or unhealthful soil conditions, appear to have been due principally to nonobservance of the rules of personal, domestic, or public hygiene. Along this line the following simple health rules, published by the Bureau of Health on cards for general distribution, are quite to the point:

> It is easier to maintain good health in the tropics than in the United States, but in order to do so you should observe the following simple rules:
>
> 1. Be vaccinated to-day. The Bureau of Health will do it free of charge.
> 2. Never drink any water unless it has been either boiled or distilled, nor eat any raw vegetables. If you observe this rule carefully you will probably never contract dysentery, typhoid fever, cholera, or any other disease that originates in the intestines. Disregard of this rule is responsible for the return to the United States of over 50 per cent of the invalids who leave these Islands.
> 3. Fruit is wholesome, and may generally be eaten raw with impunity, provided it is of a kind that grows upon trees, well above the ground.
> 4. Avoid patent medicines. "Do not put drugs of which you know nothing into bodies of which you may know less."
> 5. Alcoholic stimulants are not necessary, the advice of "old resident" to the contrary notwithstanding.
> 6. Generally, disease-carrying mosquitoes fly only at night; therefore, always sleep under a good mosquito net.
> 7. Finally, observe the same hygienic rules that are applicable to temperate climates, including those of physical exercise.

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[9] *Am. Jour. Med. Sciences,* September (1905), 130, 497.

The marked lowering of the death rate in the United States, principally in cities, from 1890 to 1900, and in Cuba, Porto Rico, and Panama more recently, is invariably attributed to improvement in the water supply, in the method of disposal of sewage, to the elimination of cesspools and stagnant ponds, to proper drainage, to the destruction of or protection against disease-bearing mosquitoes, to a better milk supply, or to more healthful dwellings; in brief, to improved sanitary conditions.

> In Panama, "malaria has been so controlled that the sick rate of our total force in the month of April, 1907, was less than 17 per thousand; that is, out of every thousand men at work on the canal we had on an average during the month only 17 sick in hospitals each day. Among 6,000 Americans in the employ of the Commission, including some 1,200 American women and children, the families of these employees, we have but little sickness of any kind, and their general appearance is fully as vigorous and robust as that of the same number of people in the United States. During the year 1906 our death rate from disease among American employees was less than 4 per thousand. We believe that we have demonstrated that the tropical diseases, yellow fever and malaria, can be entirely controlled in the Canal Zone * * *. For the last sixteen months pneumonia has been very fatal among our negro laborers, being confined almost entirely to this class of labor. It affects the whites very seldom. * * * I am inclined to think that the advances made in recent years in tropical sanitation will have a much wider and more far-reaching effect than freeing Havana of yellow fever or enabling us to build the Panama Canal. I think the sanitarian can now show that any population coming into the tropics can protect itself against these two diseases by measures that are both simple and inexpensive; that with these two diseases eliminated life in the tropics for the Anglo-Saxon will be more healthful than in the temperate zone; that gradually, within the next two or three centuries, tropical countries, which offer a much greater return for man's labor than do the temperate zones, will be settled by the white races, and that again the centers of wealth, civilization, and population will be in the tropics, as they were in the dawn of man's history, rather than in the temperate zones, as at present."[10]

Great as is the work done by the United States in her other tropical possessions, a work of no less magnitude is being accomplished here. Whether in the Tropics, in the temperate zones, or in the arctic regions, the maintenance of health is ever largely dependent upon good hygiene and good sanitation. Any untoward influence of "tropical light" may apparently be easily obviated by the selection of underwear of the proper color, and an appropriate head covering, e. g., a cork helmet. These simple and inexpensive preventive measures appear to have been almost completely ignored by the American soldier and civilian in the Philippines.

What does the future promise in the way of further improvement in the health conditions in the Philippines? Within the coming year a modern sanitary sewerage system for the city of Manila and a system of water supply better in quality and quantity than the present one will have been completed; as will also the greatly-needed modern and well-equipped general hospital in Manila, the corner stone of which has already been laid. The facilities of this institution, together with the application of the results of the work of research in the field of scientific medicine conducted in the Bureau of Science, must tend greatly to alleviate human suffering from disease and to enable practical instruction to be given in the new medical school just established.

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[10] "Sanitation in the Canal Zone," an address to the graduating class, 1907, of the Cornell University Medical College; Gorgas, *J. Am. Med. Ass.* (1907), **49**, 6.

Sanitary improvements are contemplated or under way in the larger towns of the Archipelago outside of Manila, and under the direction of the Bureau of Public Works the sinking of artesian wells in the provinces will be continued, thus cutting off a fruitful source of disease in rural communities by furnishing a better supply of drinking water.

The problem of reducing the very high infant mortality in the Philippines, due largely to improper food, seems about to be worked out through the more common use of pure milk, importations of which from Europe, Australia, and the United States have recently reached enormous proportions. Where drops of pure cows' milk were used by Filipinos in the earlier days of American occupation, quarts are now being employed. In actual application the "*gota de leche*" idea has been expanded into "*litro de leche.*"

The Pure Food and Drugs Act recently put into force in the Philippines will hereafter insure wholesome food, so important in any climate. The Director of Health is of the opinion that "from the character of the foods which have been rejected, it appears probable that much of the illness which has heretofore been ascribed to the tropical climate was probably due not so much to the effects of the climate as to the effects of the chemicals which the food products contained, prepared by foreign manufacturers for the use of the residents of tropical countries."

Hospitals and other institutions so essential to the well-being of a community and especially to those far from home, have recently been completed, are already under construction, or will be under way before the close of the year. St. Paul's Hospital, founded by the Archbishop of Manila, has been in operation nearly three years. There have been completed modern hospitals for the Navy at Cañacao, for the Army at Fort William McKinley and Baguio and at Army posts in other parts of the Archipelago; there are also the University General Hospital in Manila established by the Episcopal Church, and a large general hospital at Iloilo built by the Presbyterians. Two weeks hence the corner stone of the Methodist Hospital in Manila for women and children will be laid, while a new general hospital at Baguio is nearly completed. The churches have also opened several dispensaries in Manila and in the provinces, thus supplementing the work of the Bureau of Health in caring for the sick.

New club houses and gymnasia are being built in Manila and athletic fields developed. Excellent transportation facilities by railway and motor cars to Baguio and living accommodations there, render Baguio available this year to large numbers for the first time. An altitude of 5,000 feet, a temperature generally ranging from 12° to 22° C., pine forests, and a pure water supply, combine to make Benguet Province one of the most healthful places in the world. Fruits and vegetables of the temperate zone are being cultivated in this province. Many miles of first-class wagon roads have been constructed, a club house has been built, and golf links have been laid out.

Before the close of the coming year, with the masses of the christianized Filipinos of the Archipelago immune from smallpox, with the segregation of all lepers in the Islands at the Culion colony, with the completion of sanitary improvements of great magnitude now in progress, with the more complete extension of systematic scientific methods of sanitation to all parts of the Islands, and with the wider dissemination of sanitary knowledge among the people, it is hoped the battle waged under unusual difficulties to conquer disease in the Philippine Islands will have been partially won and some of the great problems in the realm of preventive medicine solved.

THE PREVENTION OF TROPICAL ABSCESS OF THE LIVER BY THE EARLY DIAGNOSIS AND TREATMENT OF THE PRESUPPURATIVE STAGE OF AMŒBIC HEPATITIS.[1]

By Leonard Rogers.[2]

During the last seven years I have enjoyed most exceptional opportunities for studying tropical abscess of the liver in Calcutta, and have now arrived at the conclusion that the disease can and should be prevented altogether in the great majority of cases. The following are, briefly, the steps by which I have reached this position.

In 1902[3] I published a paper on tropical or amœbic abscess of the liver and its relationship to amœbic dysentery, in which I gave tables to show that I had found living amœbæ in scrapings from the walls of 35 out of 37 consecutive liver abscesses, the two negative results being in those livers not examined until twelve or more days after the abscess had been opened and drained. Further, two-thirds of the abscesses, when first opened, were sterile as regards the presence of bacteria. Kruse and Pasquale had previously found amœbæ in only 6 out of 15 cases of liver abscess. I also showed that when both a clinical history and a post-mortem were available, in 90 per cent of the cases dysentery was found to be associated with the liver abscess, and in 95 per cent of these there was evidence that the dysentery preceded the formation of the abscess, which was always, in my experience, of the amœbic variety. I therefore concluded that the large tropical abscesses (as opposed to those due to suppuration in the portal veins or in the bile ducts) were always due to the *Amœba dysenteriæ* and were secondary to amœbic dysentery, although the latter might often be of a latent nature, giving rise to no typical dysenteric symptoms during life, but revealing itself in the shape of a few amœbic ulcers found post-mortem, usually high up in the large bowel in the cæcum or ascending colon.

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[1] Read at the Fifth Annual Meeting of the Philippine Islands Medical Association, February 29, 1908.

[2] Professor of Pathology, Medical College, Calcutta.

[3] *Brit. Med. Journ.* (1902), 2, 844.

In a second paper, in 1903,[4] I gave an account of amœbic dysentery in India, illustrated by a colored plate, and discussed the mode of formation of amœbic abscess of the liver, and in 1905,[5] I dealt with the value of leucocytosis in the early diagnosis of amœbic abscess, and pointed out that, although occasionally an attack of acute hepatitis with leucocytosis may clear up without suppuration occurring, yet if such cases are followed up, sooner or later an abscess of the liver nearly always forms. I also narrated a case of acute hepatitis with leucocytosis, which cleared up under large doses of ipecacuanha. In 1906[6] I published an article on two cases of amœbic abscess of the liver successfully treated by aspiration and injection of the soluble acid quinine hydrochloride, without drainage, having found that the amœbæ in thick liver abscess pus could readily be killed by that drug in a strength of from 1 in 100 to 1 in 500, a method which has since proved effective in other hands, especially in early, deep-seated abscesses although it fails in many more advanced cases.

While on the lookout for the early stages of the disease for this line of treatment, I met with a number of cases of fever with leucocytosis and symptoms of acute hepatitis, in some of which aspiration failed to reveal any abscess; they yielded, however, very rapidly to full doses of ipecacuanha, thus showing that the increase of the leucocytes takes place before actual suppuration has set in and sometimes many days earlier. Last year (1907)[7] I published a series of such cases which were rapidly cut short in the presuppurative stage by the ipecacuanha treatment, which may be briefly summarized as follows:

> Fifteen cases were met with during twelve months in the Calcutta European General Hospital. In only three was there a clear history of dysentery or symptoms of it while in hospital, while these lost their fever and hepatitis after two to four days treatment with ipecacuanha, although they had previously suffered from fever for fifteen, thirty-four, and forty-one days respectively, and one had been aspirated for liver abscess with a negative result. In three more cases of acute hepatitis, without dysentery, not treated by ipecacuanha, the fever only subsided after from thirty-four to forty-nine days. In five similar cases treated with ipecacuanha the fever subsided in from one to six days, although it had previously persisted for from thirteen to fifty days, one patient having been aspirated with a negative result. Lastly, there were three cases of fever with no signs of either dysentery or hepatitis, other than very slight painless enlargement of the liver, but with leucocytosis of the same type as in the other cases, namely without very marked increase of the proportion of the polynuclears (usually from 70 to 80 per cent.) They had suffered from fever for thirty-five, forty-five, and fifty-three days, respectively, which ceased in from two to fifteen

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[4] *Brit. Med. Journ.* (1903), **1**, 1315.

[5] *Ibid.* (1905), **2**, 1291.

[6] *Ibid.* (1906), **1**, 1397.

[7] *Practitioner* (1907), **78**, 766; Fevers in the Tropics (Oxford Medical Publications) (1908).

days under ipecacuanha. This is the class of case in which a large, deep-seated, fibrous walled amœbic abscess of the liver forms very insidiously with irregular intermittent fever; it is commonly treated as malarial, and there are no obvious signs of hepatitis until a very late stage. Two of the above fifteen cases relapsed and returned to the hospital four and seven months later, respectively, with an amœbic abscess of the liver.

When dysentery is present and complicated by hepatitis, ipecacuanha is advised by Sir Patrick Manson and other authorities, but at the time the above paper was published I was unable to find any recent writer who recommended large doses of ipecacuanha for hepatitis when accompanied by dysentery, although several of the older authors in India, especially McClean and Norman Chevers, also strongly urged its use for this purpose. The considerations which led me regularly to adopt this treatment were the finding of dysentery associated with 90 per cent of tropical liver abscesses, and the fact mentioned above, that in many patients dying of liver abscess, without history or symptoms of dysentery, amœbic ulcers are found post-mortem in the upper part of the large bowel. I therefore regarded hepatitis, accompanied by leucocytosis, as an indication of the presence of latent amœbic ulceration of the large bowel, which indicated large doses of ipecacuanha for its cure. The results of this treatment, both of those cases mentioned above and of subsequent ones, have been so successful that during the last two years no instance of liver abscess has developed while the patient was in the European General Hospital, Calcutta, although a few patients have been admitted with an abscess already formed. A number of cases of such acute hepatitis in which an abscess was suspected (and in five instances sought for in vain by the aspirating needle) have cleared up entirely under the ipecacuanha treatment. The following three examples, which have occurred during the last two months, will serve to illustrate the value of this method of treatment.

CASE 1. *Very acute hepatitis following on dysentery, rapidly cured by ipecacuanha.*—A European male, aged 25, was admitted for dysentery of six weeks' duration, passing, without pain or straining, about six stools daily containing blood and mucus. He was treated with a castor oil mixture and with creolin enemas and the blood and mucus disappeared from the stools after ten days. Seven days later (September 11) he began to suffer pain in the hepatic region and in the right shoulder and his temperature, which had previously been slightly subnormal, began to rise. (See chart 1.) The liver dullness was not increased, extending from the sixth rib to the costal margin. The pains continued to be severe, and on the 13th the breath sounds were noted to be weak at the base of the right lung. Morphine was given for the pain, and quinine, 10 grains, three times a day for the fever. On the 15th there was profuse sweating, while the liver dullness reached up to the fifth rib. Five leeches over the liver relieved the pain somewhat. On the 16th, the right chest was observed to be moving less than the left, and on the 18th, X rays showed that the diaphragm on the right side was quite motionless, while there appeared to be a slight shadow in the right lobe of the liver.

Abscess of the liver was diagnosed. However, as there had been recent dysentery, which had not been treated by full doses of ipecacuanha, the physician in charge of the patient (who had over twenty years' experience with Indian diseases) agreed to use the ipecacuanha treatment for a short time before operating on the liver abscess, the existence of which he did not doubt. Thirty grains of the drug were given daily from the 19th to the 27th, with the result that the temperature steadily fell as shown in chart 1, and the signs of acute hepatitis simultaneously completely subsided. On the 20th, the pain over the liver and the sweating had both diminished, and the patient slept better. By the 21st, the pain had ceased over the liver, although it continued in a slight degree in the right shoulder for another day. On the 23d, the temperature was normal and there was no pain or sweating, and all suspicion of liver abscess had disappeared. The patient was kept in the hospital up to the 22d of November, but had no more signs of dysentery or hepatitis and gained weight steadily. There was no shadow of doubt in the minds of all who watched this patient that the ipecacuanha treatment averted suppuration in the liver.

CASE 2. *Dysentery followed by hepatitis with temporary recovery; very acute hepatitis successfully treated two and one-half months later with ipecacuanha.*—European male, aged 26, admitted August 20, 1907, with a history of dysentery eight months before, followed after three weeks by pain in the epigastrium. On admission there was slight enlargement of the liver with pain over it. Stools loose, but no blood or mucus; intermittent fever rising to 101° or 102° F. in the evenings. The diaphragm moved well, and there was only a slight increase of the leucocytes, with but 65 per cent of polynuclears. The symptoms of hepatitis subsided in three weeks under salines and quinine, and the patient left the hospital apparently well. He returned two and a half months later (November 26) having had fever every evening for the previous month and a half, with rigors at times and intermittent, sharp pain over the liver. His bowels had been constipated. He was now weak and thin. There was slight bulging in the hepatic region, without marked tenderness. The breath sounds at the right base were diminished, with a decrease of vocal fremitus and vocal resonance. The liver dullness extended from the fifth space to 3 inches below the costal margin in the nipple line. No œdema was present. The spleen was not enlarged. Under X rays the right half of the diaphragm was observed to be 2 inches higher than the left and scarcely moved, even with deep respiration, but there was no shadow. A blood count showed red corpuscles 3,570,000, white 15,000, ratio of white to red, 1 to 236; polynuclears 77, lymphocytes 23; large mononuclears 9 and eosinophiles 1 per cent.

Because of the acuteness of the symptoms and the fullness in the hepatic region, liver abscess was suspected, but it was determined to try the ipecacuanha treatment before operating, so 30 grains were given on the evening of the 27th, and 40 grains on the following four evenings. On the 28th and 29th the hepatic pain was distinctly less, and the patient could turn over on his right side, which he could not do before. On the 30th there was no pain or tenderness over the liver. On the 2nd of December his temperature remained normal for the first time, and a steady convalescence followed, the liver receding until it was only just felt beneath the costal margin. The ipecacuanha was continued in 30-grain doses at increasing intervals up to January 5, 1908, in order to guard against the possibility of a relapse, and the patient left the hospital apparently quite well on January 9. The rapid lessening of the pain, followed by the decline of the fever and decrease in the enlargement of the liver under the ipecacuanha was most striking in this case, and indicated that the treatment prevented suppuration of the liver.

CASE 3. *Hepatitis, history or symptoms of dysentery rapidly subsiding under ipecacuanha treatment.*—European male, aged 51, admitted on December 3, 1907, for fever. He had been ill for two weeks with fever and pain in the right hypochondrium, with nausea and loss of appetite. No rigors, but the patient felt chilly at times, with sweats at night. The bowels were constipated. The liver extended 1 inch below the costal margin, and was very tender. Other organs normal. A blood count on the 11th showed 4,670,000 red corpuscles, 12,875 white, ratio of white to red 1 to 363, polynuclears 81, lymphocytes 12, large mononuclears 6, and eosinophiles 1 per cent.

Ipecacuanha was commenced on the 7th of December, 30 grains being given each evening. Two days later the temperature began to decline and reached normal on the 11th, after which there was only one rise on the 13th accompanied by a rigor, being possibly malarial in nature. On the 17th the liver had become reduced in size, being only just felt below the ribs, and the patient left the hospital apparently quite well on the 22d of December. (See chart 3.) This is an example of the less acute form of hepatitis, which drifts insidiously on into suppuration after weeks of intermittent fever. It is only one step further to the class already mentioned, in which there is no pain or tenderness over the liver, and the leucocytosis alone raises a suspicion as to the true nature of the case, which suspicion is confirmed by the chronic fever rapidly yielding to large doses of ipecacuanha.

METHODS OF GIVING IPECACUANHA.

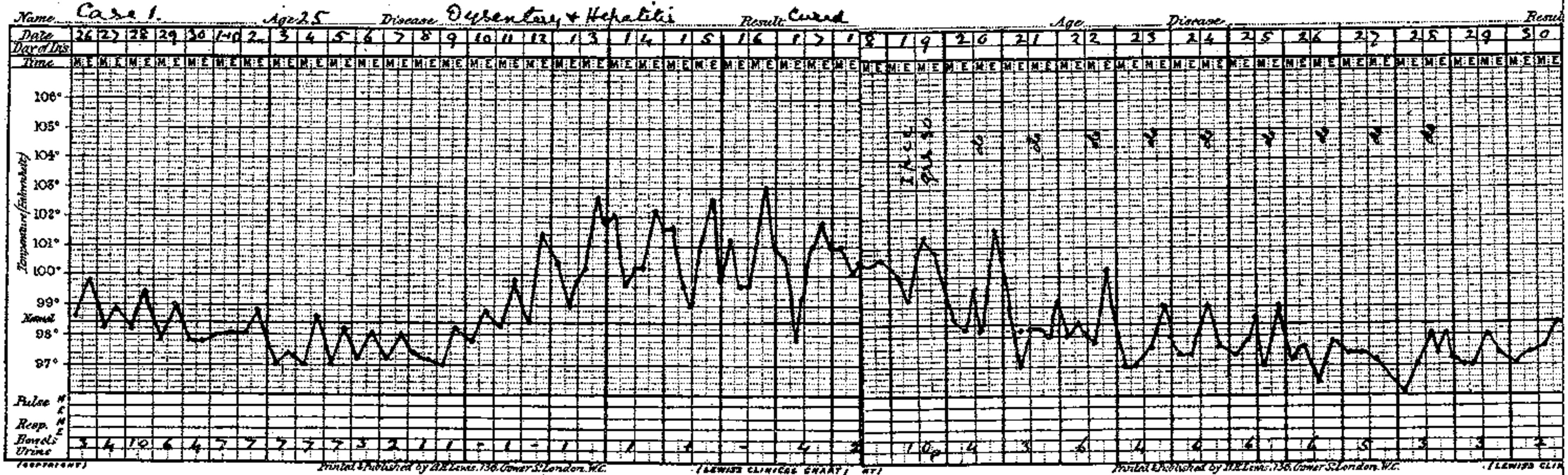
In giving large doses of ipecacuanha in amœbic dysentery and hepatitis, precautions must be taken to avoid vomiting, especially if it is possible that an abscess of the liver has already formed. The usual method is to give either tincture of opium or chloral hydrate some twenty minutes before the powdered ipecacuanha, no food or drink being given for several hours before and after the dose, which is best administered once a day in the evening. Recently I have had the drug put up in quantities of 5 grains in keratinized capsules, which are not dissolved until they reach the small intestines, and this has worked very well, no antecedent sedative being required. Dr. R. B. Grubbs, of the United States Army, has recently informed me that the same effect is produced by coating ipecacuanha pills with melted salol, but I have not yet had an opportunity of trying this method. From 30 to 60 grain doses of the drug have been used, but the smaller quantity appears to be sufficient. It should be continued for at least two weeks at increasing intervals, as two of my earlier cases, in which the ipecacuanha was discontinued as soon as the temperature fell, subsequently relapsed some months later, presumably owing to the latent amœbic ulcers not having been completely cured.

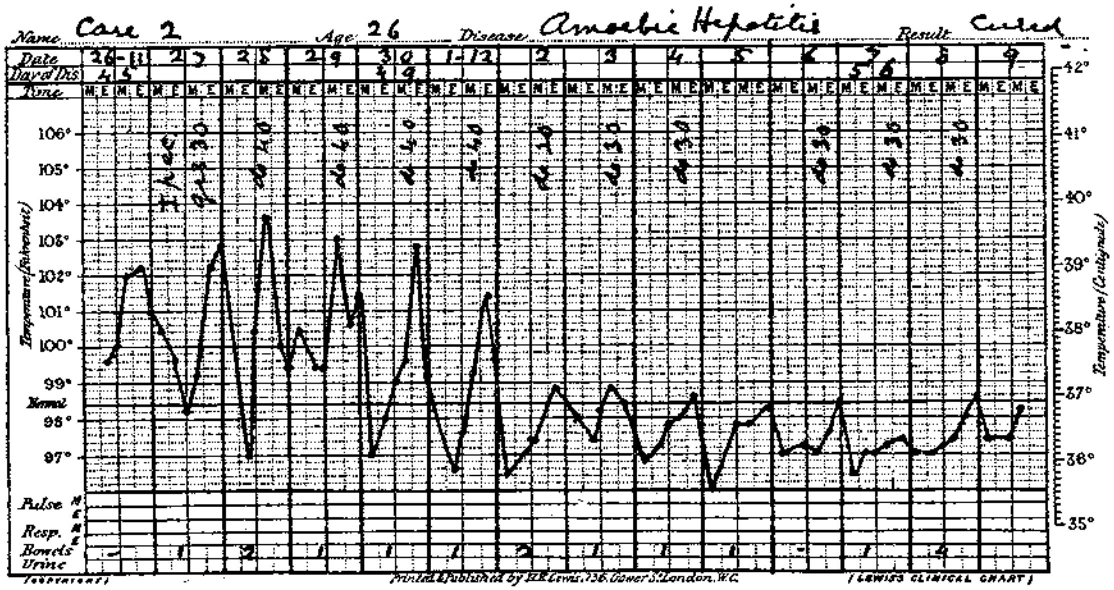
DURATION OF THE PRESUPPURATIVE STAGE OF AMŒBIC HEPATITIS.

There remains to be considered a very important question. What is the usual duration of the presuppurative stage of amœbic hepatitis, during which the ipecacuanha treatment will avert the formation of an abscess in the liver? An examination of my records during the last seven years has furnished the following data: Out of fifty-three native patients admitted to the hospital with liver abscess, often bulging through the thoracic or abdominal wall, 51 per cent gave a history of over two months' illness, and an additional 38 per cent, one of between one and two months; 9 per cent from two weeks to a month, and only 2 per cent under two weeks. Among 26 cases in Europeans there had been fever or hepatitis for over one month in 50 per cent, from two weeks to a month in 34.6, and of less than two weeks in only 13.4 per cent (4 cases of 9, 11, 7, 13 days respectively). It is clear from these figures that in the vast majority of instances there is ample time for the diagnosis by the blood examinations and for the ipecacuanha treatment during the presuppurative stage. Very rarely multiple abscesses may develop within a few days with extreme acuteness, yet I believe it is not too much to say that over 90 per cent of amœbic abscesses of the liver can and should be prevented by the methods described in this communication, and thus one of the greatest scourges of some tropical countries may be conquered.

ILLUSTRATIONS.

Charts 1, 2, and 3. 291


Name Case 1.
Age 25
Disease Dysentery & Hepatitis
Result Cured
Date
Day of Dis.
Time
Temperature (Fahrenheit)
106°
105°
104°
103°
102°
101°
100°
99°
Normal
98°
97°
Pulse
Resp.
Bowels
Urine
Ipec. gr. 30
Printed & Published by H.K. Lewis, 136. Gower St. London. W.C.
(LEWIS'S CLINICAL CHART)


Name Case 2
Age 26
Disease Amoebic Hepatitis
Result Cured
Date
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Time
Temperature (Fahrenheit)
Temperature (Centigrade)
106°
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104°
103°
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Pulse
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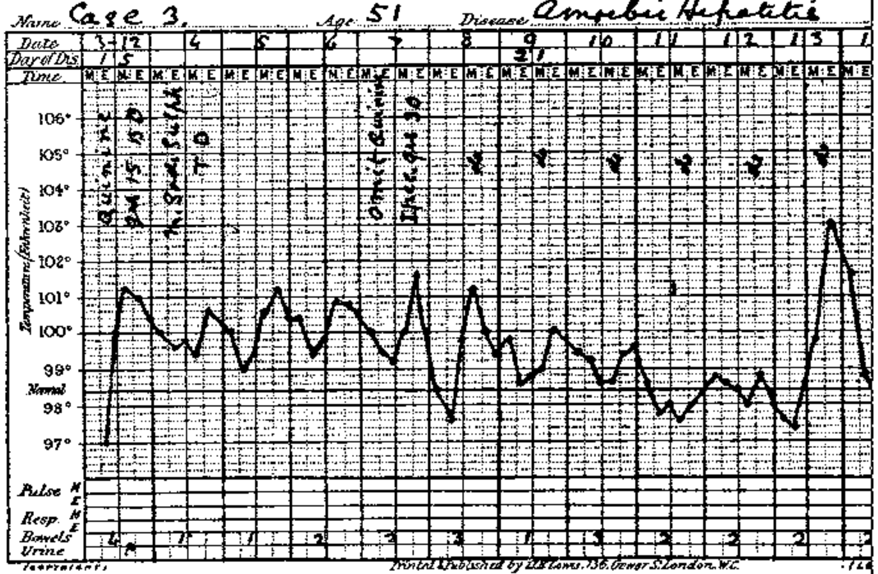
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Age 51
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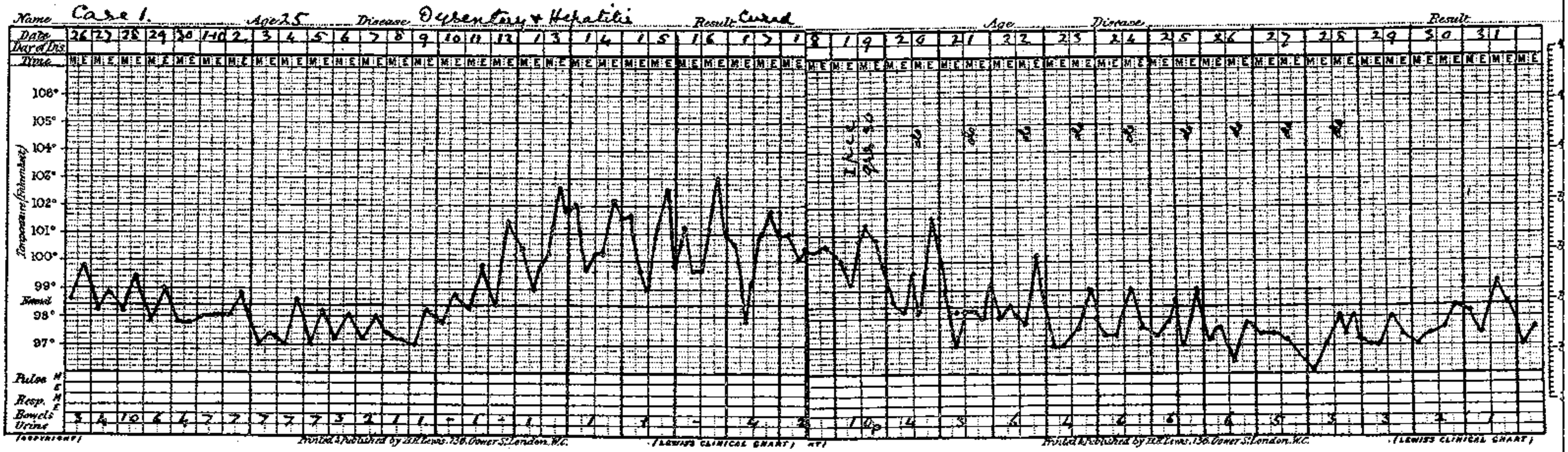
Printed & Published by H.K. Lewis, 136. Gower St. London. W.C.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Age 25
Disease Dysentery & Hepatitis
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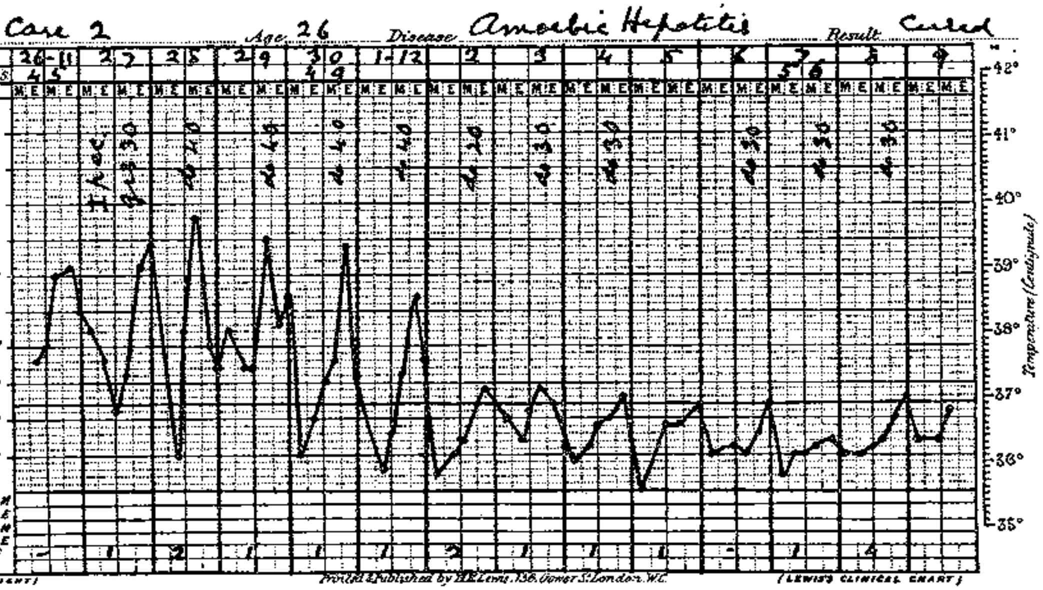
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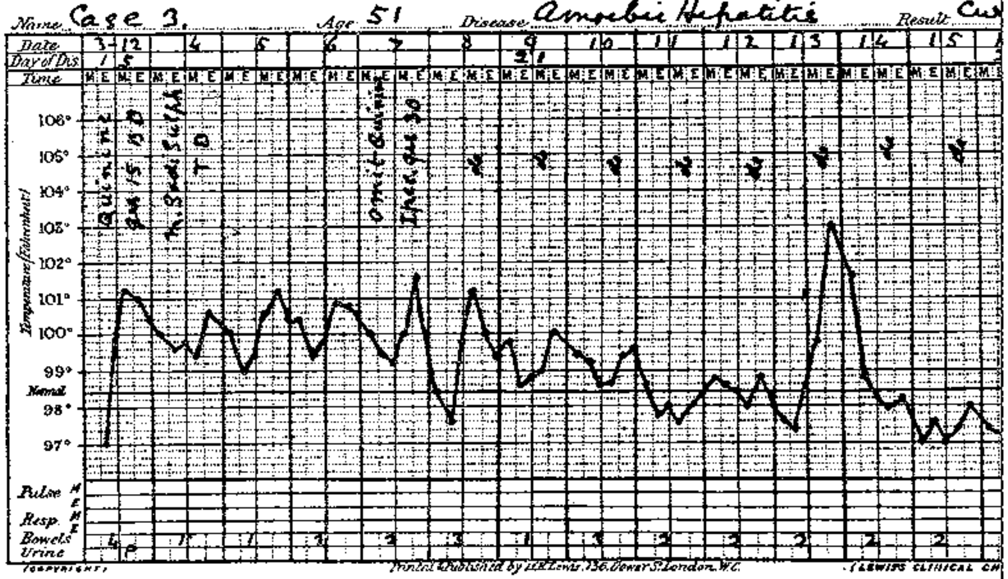
Name Case 3.
Age 51
Disease Amoebic Hepatitis
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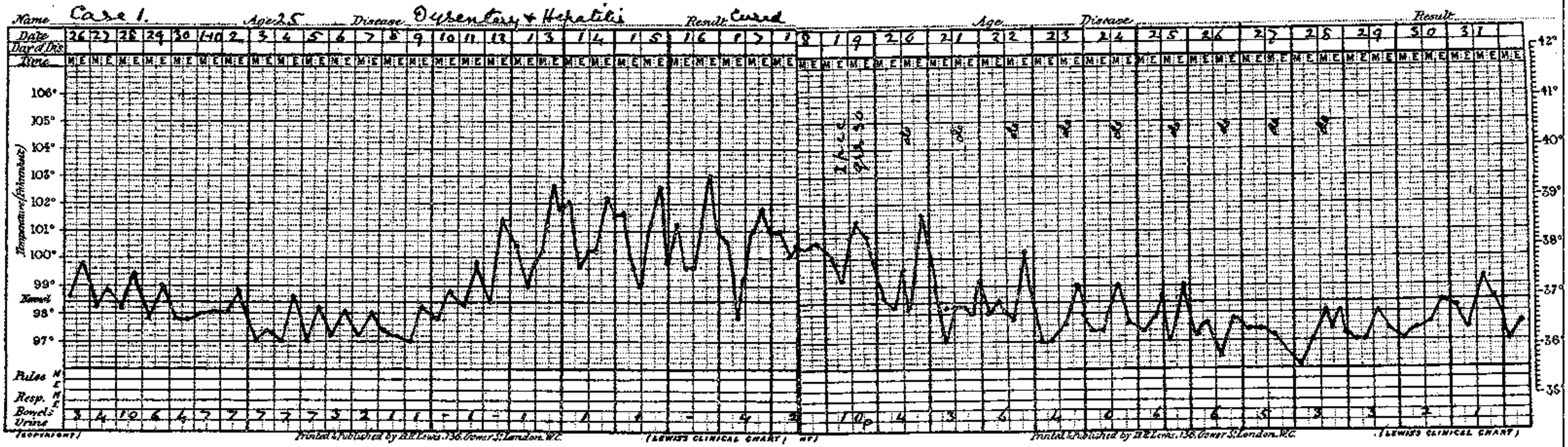
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Disease Dysentery & Hepatitis
Result Cured
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Temperature (Fahrenheit)
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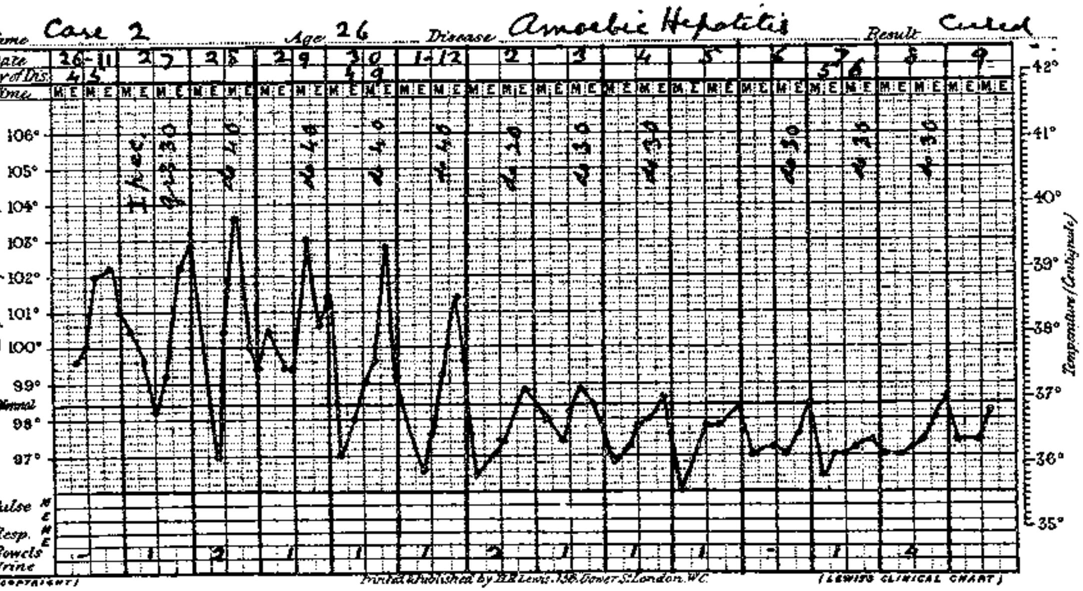
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Age 26
Disease Amoebic Hepatitis
Result Cured
Temperature (Centigrade)
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Pulse
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Bowels
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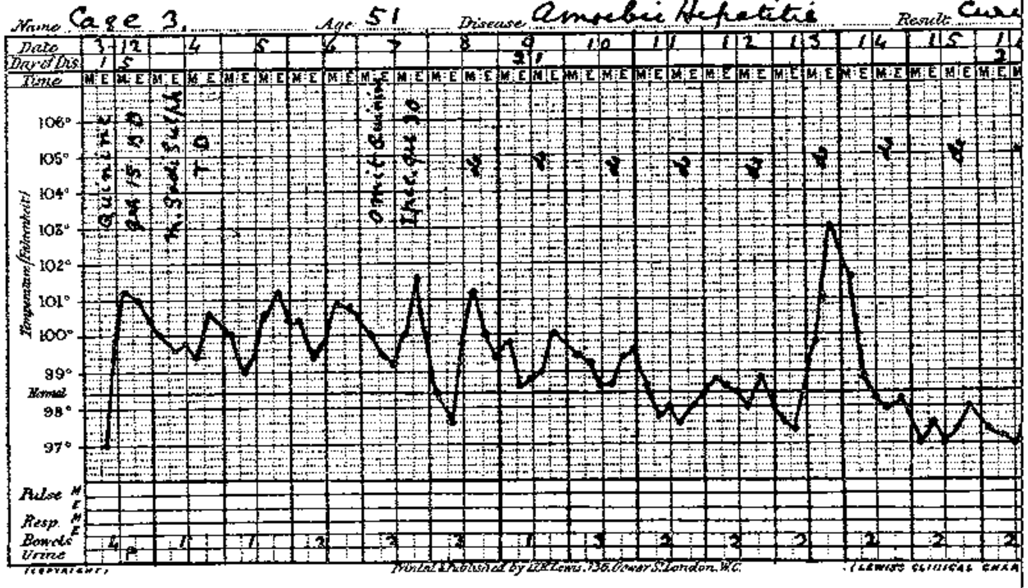
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Age 51
Disease Amoebic Hepatitis
Result Cured
Date
Day of Dis.
Time
Temperature (Fahrenheit)
Quinine
Normal
Pulse
Resp.
Bowels
Urine
Printed & Published by H.K.Lewis, 136, Gower St. London, W.C.
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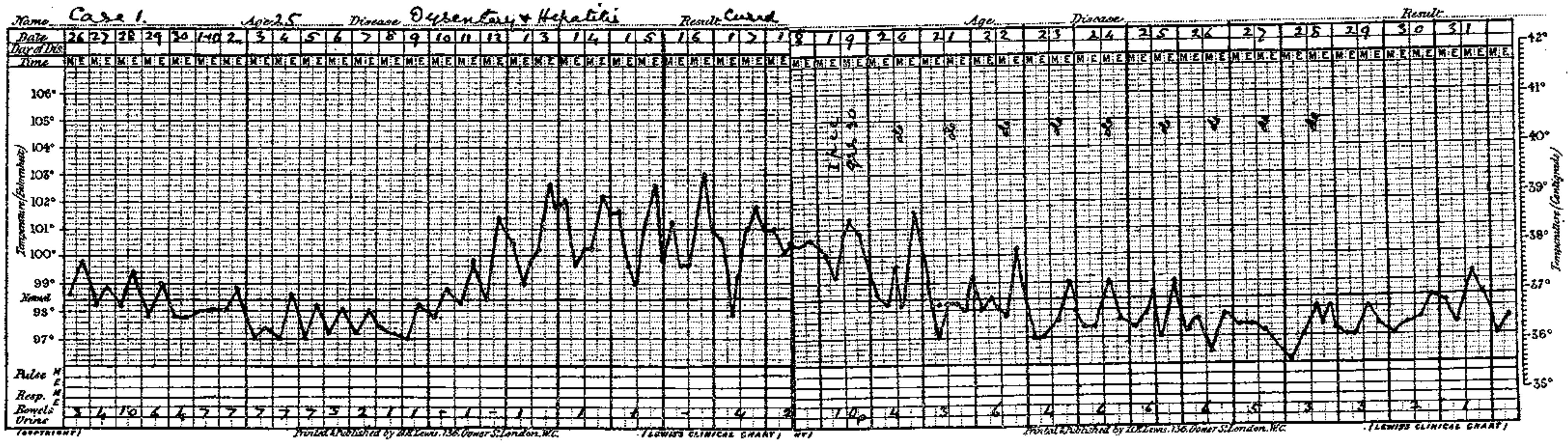
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Age 25
Disease Dysentery & Hepatitis
Result Cured
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Temperature (Centigrade)
Ipec gr. 30
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Pulse
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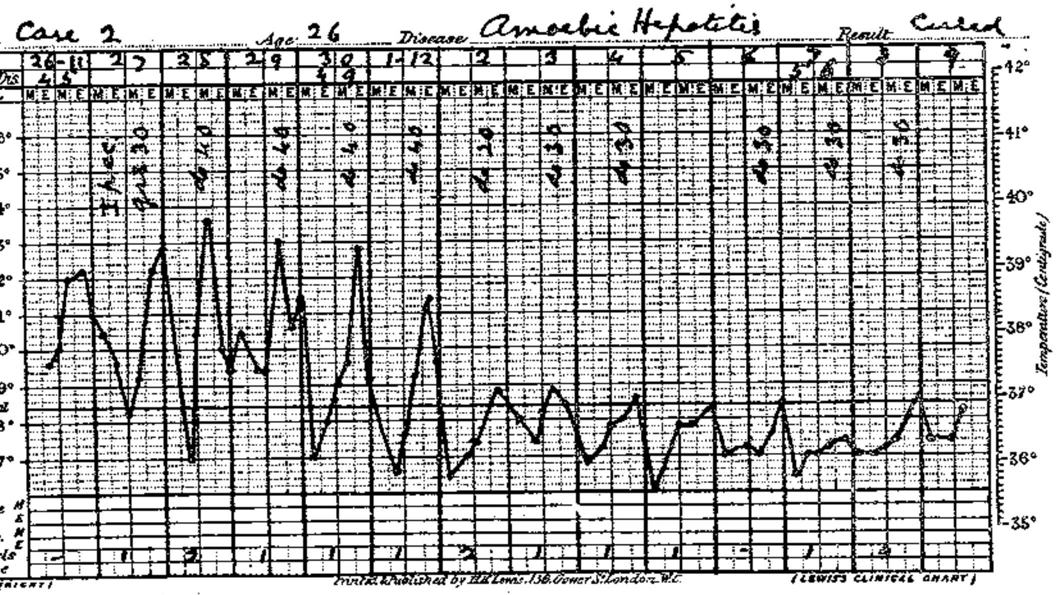
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Disease Amoebic Hepatitis
Result Cured
Ipec gr 30
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42°
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Temperature (Centigrade)
Printed & Published by H.K. Lewis, 136, Gower St. London, W.C.
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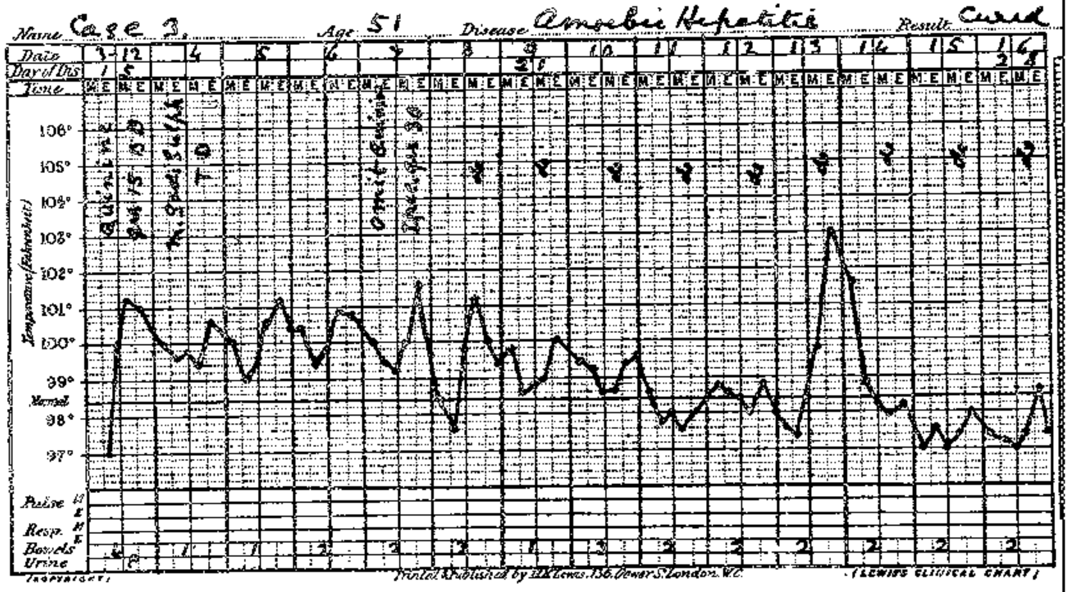
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Age 51
Disease Amoebic Hepatitis
Result Cured
Date
Day of Dis.
Time
Quinine gr 15 B.D
M. Sod Sulph T.D
Omit Quinine
Ipecac gr 30
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Temperature (Fahrenheit)
Pulse
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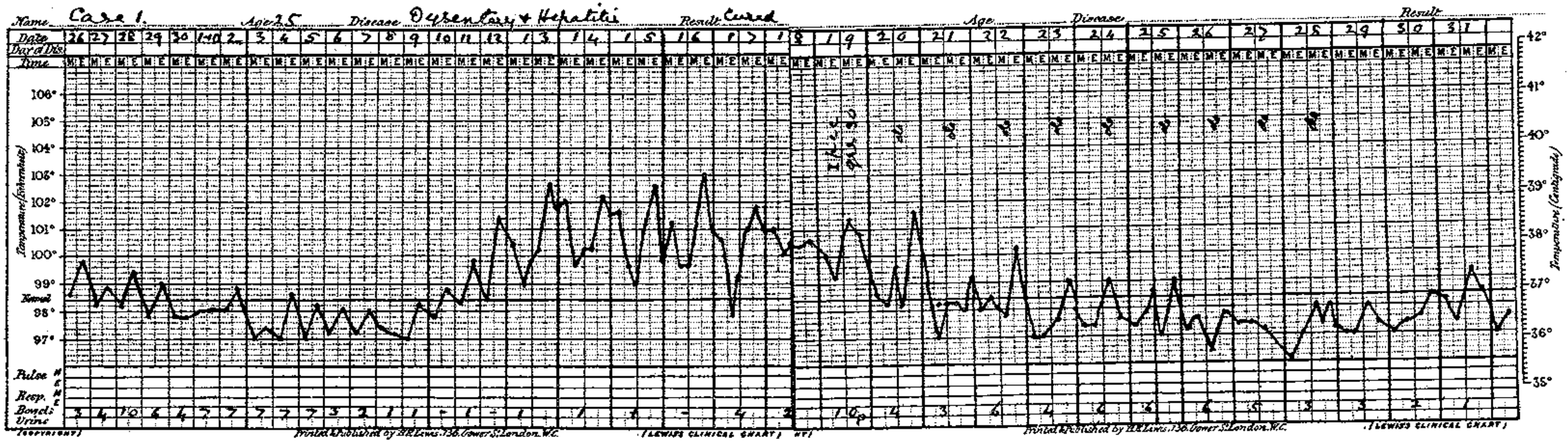
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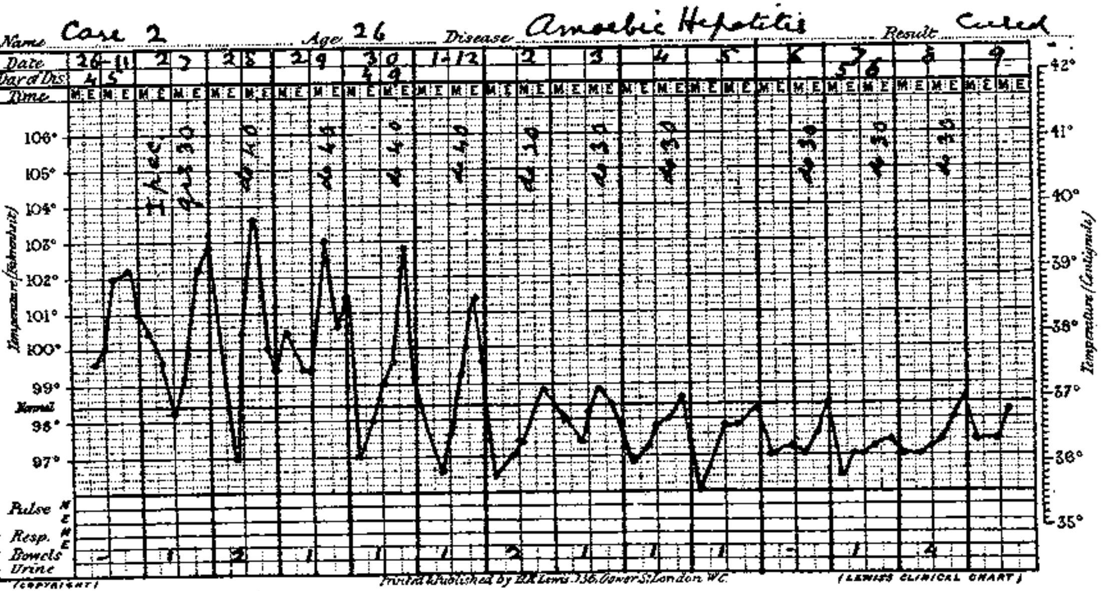
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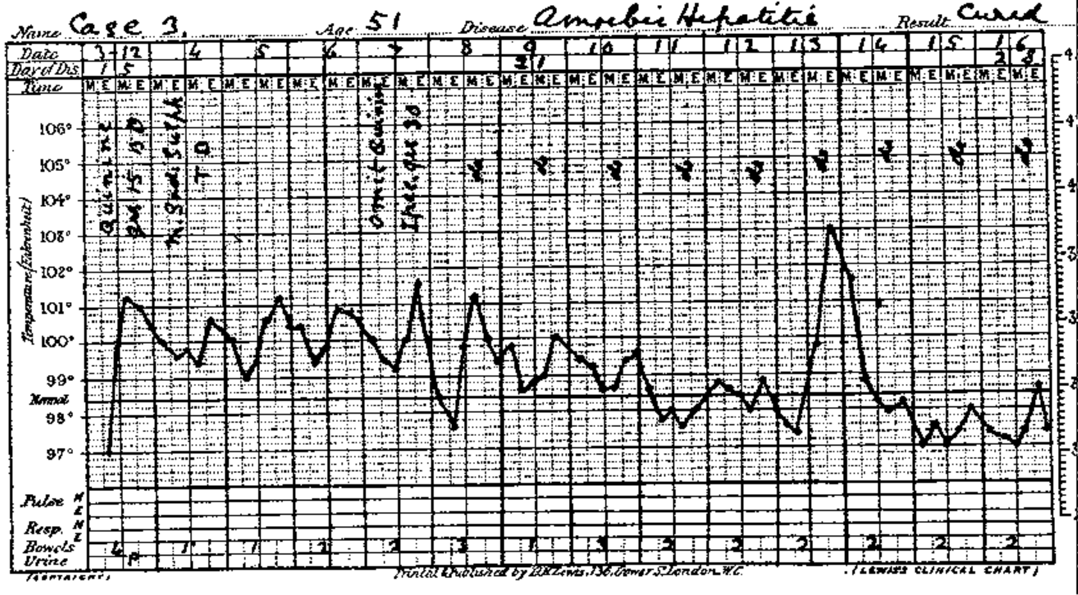
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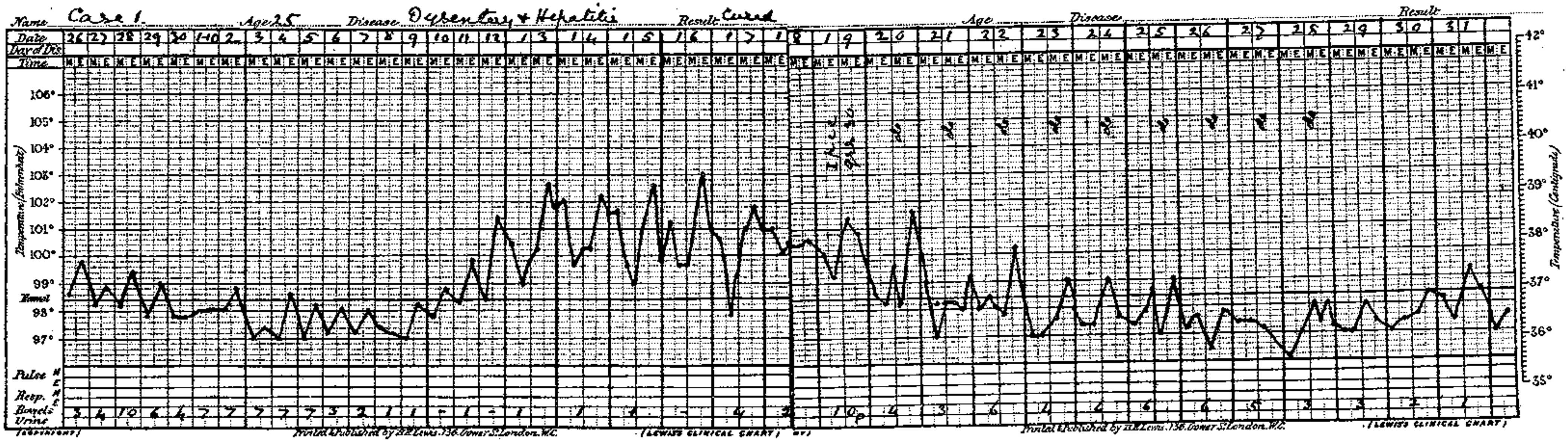
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Age 25
Disease Dysentery & Hepatitis
Result Cured
Date
Day of Dis.
Time
Temperature (Fahrenheit)
Temperature (Centigrade)
Pulse
Resp.
Bowels
Urine
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omit Quinine
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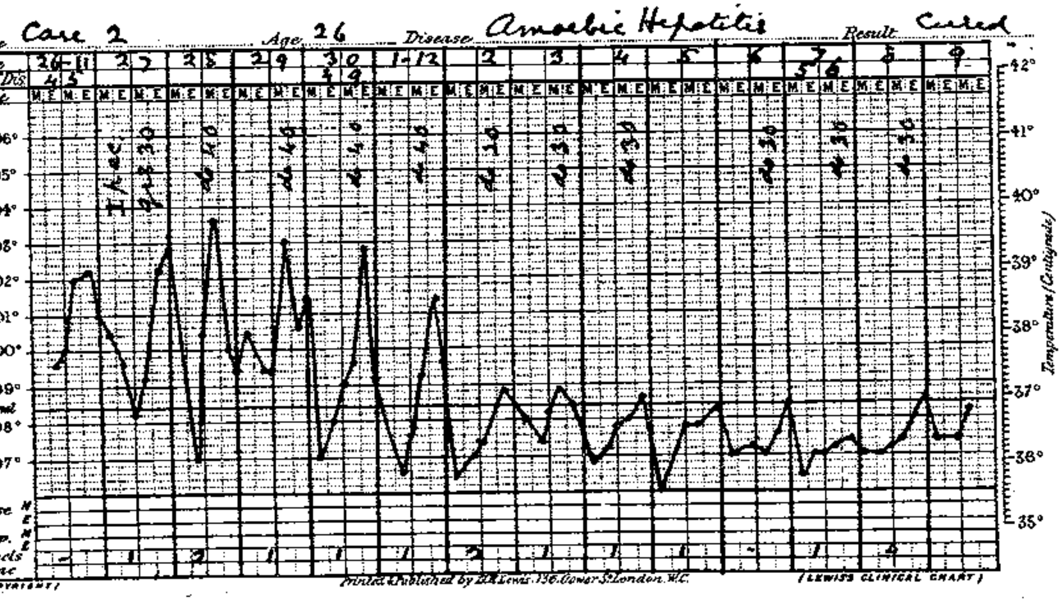
Case 2
Age 26
Disease Amoebic Hepatitis
Result Cured
Temperature (Centigrade)
Printed & Published by H.K.Lewis, 136 Gower St. London, W.C.
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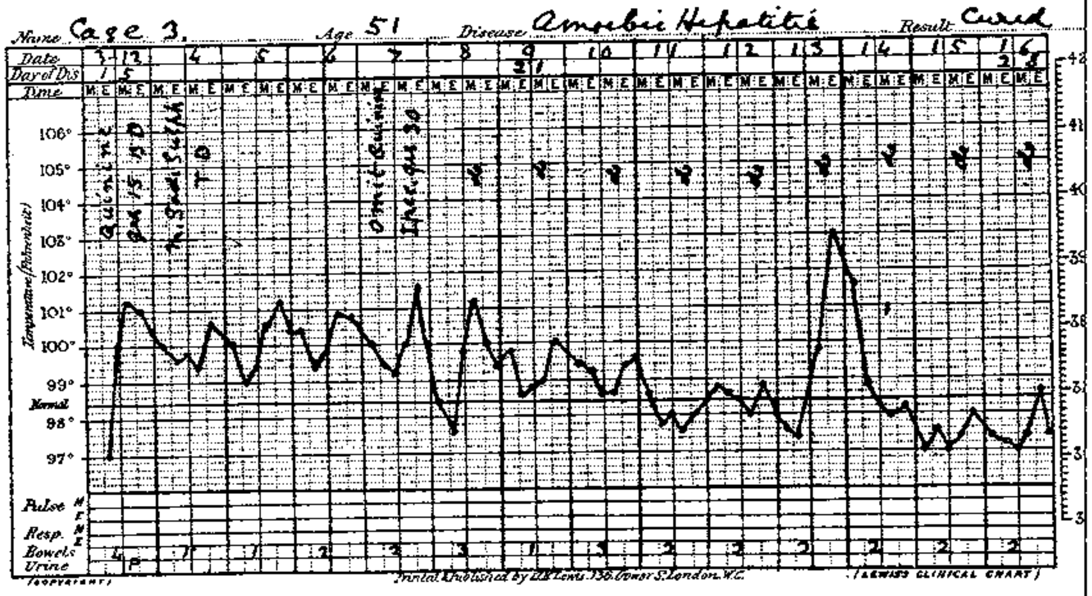
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Age 51
Disease Amoebic Hepatitis
Result Cured
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FILARIASIS AND ELEPHANTIASIS IN SOUTHERN LUZON.[1]

By JAMES M. PHALEN and HENRY J. NICHOLS.[1]

I. INTRODUCTORY AND HISTORICAL.
II. ELEPHANTIASIS.
III. FILARIASIS.
IV. THE PARASITE.
V. MOSQUITOES.
VI. RELATIONSHIP OF FILARIA TO ELEPHANTIASIS.
VII. TREATMENT AND PROPHYLAXIS.
VIII. SUMMARY AND CONCLUSION.

I. INTRODUCTORY AND HISTORICAL.

It has been well known for years that filarial disease exists in the Philippine Islands, and the occurrence of its sequelæ, elephantiasis in its various phases also has been noted occasionally; but at the present time little is known concerning the frequency and distribution of these important maladies. A circular issued in 1901 from the office of the chief surgeon, Philippines Division, makes the first mention of filariasis in the Philippine Islands, as far as we are able to discover. This circular notes the discovery by Strong of a microfilaria in the blood of a European resident of Iloilo, the parasite being designated the *Filaria nocturna.*

Calvert, in 1902, performed an autopsy upon the body of a Filipino plague victim, and found groups of lymphatic varices in the pelvis and later an adult filaria in sections of the iliac lymphatics. This led him to examine the blood of a number of Filipino prisoners of war, with the result that he found two filarial infections out of four hundred and twenty-six persons examined. It is interesting to note that these two infections were in natives of the Province of Albay. The species of filarial embryo found was not given, but it had a nocturnal periodicity.

Doctors W. B. Wherry and J. R. McDill in May, 1906,[2] reported a case of hæmotochyluria in a Japanese girl in whose blood were found microfilariæ having a nocturnal periodicity, and which were considered to be *Microfilariæ bancrofti*. Ashburn and Craig, in 1906, described as a new blood filaria, *Filaria philippinensis*, and the same writers in 1907 published an excellent article relating to the development of this parasite in *Culex fatigans*, Wied.[3] Their observations were made upon five cases: one, a Visayan prisoner in Bilibid in Manila, and four, members of a Bicol company of Scouts, stationed at Imus, Cavite Province.

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[1] James M. Phalen, captain, Medical Corps, United States Army, and Henry J. Nichols, first lieutenant, Medical Corps, United States Army, constituting the United States Army Board for the Study of Tropical Diseases as they occur in the Philippine Islands.

[2] Publications of the Bureau of Government Laboratories, Manila, *Biological Laboratory* (1905), 31.

Dr. E. R. Whitmore, United States Army, reported recently before the Philippine Islands Medical Society the case of an American negro soldier from Parang, Mindanao, in whose blood were found microfilariæ morphologically identical with the *Filaria philippinensis*, but having a nocturnal periodicity. This man came from Charleston, South Carolina, and had been in the Philippines less than six months when the parasite was found by Dr. Eastman, United States Army, at Parang; hence there is a question as to the locality in which this infection occurred. The writers, in conjunction with Dr. E. C. Shattuck, reported before the same society a case of chylocele in a Bilibid prisoner, resident of Manila, whose blood showed the presence of an occasional microfilaria, answering the description of the *Filaria philippinensis* and apparently without periodicity. Dr. Shattuck has also given us the history of another Bilibid prisoner, a native of Camalig, Province of Albay, upon whom he operated for a hydrocele with great thickening of the scrotum and whose blood harbored a microfilaria of undetermined type. We have been told by medical officers of the United States Army of cases of filariasis occurring in various parts of the southern Islands, but no study has been made of them nor has the species in these cases been determined.

A number of cases of elephantiasis were observed among the natives of Sorsogon Province and the results of the investigations of these cases furnishes the basis of this paper. These patients were brought into the towns of Donsol, Bulan, and Sorsogon by the local health officers as suspected cases of leprosy during the segregation of lepers in this province. The presence of such a number of these cases suggested that the focus of a large amount of elephantiasis and consequently of filariasis might be found in this section of Luzon; and with this idea in view, a trip was made into this region, Camp Daraga constituting our headquarters.

The Provinces of Ambos Camarines, Albay, and Sorsogon occupy the most southern and eastern part of Luzon. They form a narrow strip with a high, central ridge broken by volcanic peaks, such as Bulasan, Mayon and Isarog, from which the land slopes gradually to the Mindoro Sea on one side and the Pacific Ocean on the other. The land is high and well drained except along the coast. Short, rapid streams, with deeply worn courses abound everywhere. The annual rainfall is higher than in almost any other section of the Archipelago, the northeast and southwest monsoons bringing rains to a large part of this section. Vegetation is luxuriant, even for the Tropics. This is the greatest hemp district on the Island, the greater part of the land being given over to the cultivation of the abacá plant. Altogether it is difficult to find anywhere in the Islands a prettier or a more prosperous region than this country of the Bicols.

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[3] *This Journal* (1907), 2, 106.

II. ELEPHANTIASIS.

This malady is well known among the native population by the name of *titibac*. Practically the entire laboring class of this section work at some time or other with hemp (abacá), hence it is not surprising that they should attribute the disease to the effect of that plant. There seems to be a diversity of opinion as to the way in which the plant affects the individual. Some believe that elephantiasis is due to the direct action of the sap of the abacá upon the skin, but the more prevalent idea connects the disease with the strain upon the legs incident to hemp stripping and followed by getting the feet wet. Many of the women as well as the men are workers in hemp, but those who have never engaged in work of this kind usually attribute the disease to the strain of working a loom, one of which is found in every home. Another cause of the disease is said to be getting the feet wet during menstruation. The typical history given by the patients, however, is that of a day's hard work at hemp stripping and wading, while still warm, through some stream on their way home. The following day brings on an attack, which in different towns, is variously called *sorip*, *ubag* or *culibra;* during the attack the leg becomes swollen, red, and painful.[4] There is also fever and loss of appetite. With the subsidence of fever and pain, some swelling of the leg persists. In many instances the history of but one such attack can be elicited, while in many cases, especially in the aged, the enlargement seems to have come on gradually without acute symptoms. One patient was observed during such an attack. This was a woman aged 28, a resident of Daraga, Albay Province, who, ten months before, suffered her primary attack, which left the left leg markedly swollen. There was also some swelling and induration of the lower part of the thigh. When seen she had a temperature of 37°.5 C. (103°.4 F.), and complained of headache; the left leg and thigh were hot and tense to the touch and tender on pressure; large, scattered erysipelatoid patches were situated over the inner side of both leg and thigh. The femoral glands were also swollen and tender. As this patient lived a long distance from the post of Daraga, the further course of the disease could not be observed.

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[4] Probably because of the distribution of the mosquito carriers of filaria, these infections do not seem to be as numerous along the coast as in the higher lands of the interior. A European merchant of Legaspi explained the fact of there being no elephantiasis in that town by the statement that Legaspi was not in the hemp district. One man, living near the coast, attributed his elephantiasis to pulling *bejuco* (rattan), which necessitated his wading in the water.

Thirty-four well marked cases of elephantoid disease were seen. Of this number, nineteen were males and fifteen females. The ages varied from 12 to 80 years, a large proportion being above 50 years of age. The average age at which the disease first made its appearance was somewhat between 30 and 35 years. The parts affected, either alone or in association with other parts, were as follows: Both lower extremities, 13 cases or 36.4 per cent; one lower extremity, 20 cases or 58.8 per cent; one upper extremity, 2 cases or 5.8 per cent; scrotum, 11 cases or nearly 58 per cent of the males; and groin glands, 3 cases or nearly 8 per cent of the total number.

The lower extremities.—Nearly every case of elephantoid disease observed had some involvement of either one or both of the lower extremities. The degree of enlargement varied from the most moderate grade up to instances where the calf exceeded 25 inches in circumference. (Plate I, fig. 1.) Usually, the foot and leg were involved, but in a few cases only the foot and ankle, and in others the foot, leg, and thigh. The skin was usually tense and glossy over the enlargement of the leg and thigh, while it was rough and warty around the ankle and over the foot. In one case large tuberose swellings were situated entirely over the ankle and foot. (Plate I, fig. 1.) Increased pigmentation was usual, the glandular structures were atrophied, the hair thinned and roughened or absent, the nails rough, thick, and brittle. Sensation was diminished. Deep pressure, long continued, produced pitting, but the under tissues were felt to be hard and indurated. The subcutaneous tissues were seen to be increased in volume. At the ankle the skin was thrown into folds, deep fissures intervening, permitting a small range of motion to the joint. The knee joint, when the thigh was involved, was less affected and in the cases observed, movement was not interfered with. Despite the hypertrophy of these parts, the vitality appeared to be good, ulceration or abscess was not observed in any of these cases.

The cases of enlargement of the upper extremity were of moderate degree, and presented no features of importance.

The scrotum.—Somewhat over half of the males affected with elephantoid disease had some involvement of the scrotum. Usually, the enlargement was of a moderate degree, the size of a coconut or a little larger. The largest seen hung to the level of the patient's knees, was 30 inches in circumference and weighed approximately 30 pounds. No case of lymph scrotum as described by Manson or Scheube was observed, the lesion being invariably an elephantiasis. The skin was rough and coarse and the subjacent tissues enormously thickened. The penis was always retracted to some degree, and in the extreme cases (Plate I, fig. 2.) was lost sight of in the folds of the scrotum, the urine reaching the surface along a channel formed by skin.

Fluctuation could be distinguished in a large proportion of these cases, but frequently the thickening of the subcutaneous tissues was so extreme that the fluid could not be reached with an ordinary needle. This fluid, when obtained, may be milky or more commonly of a clear, straw color. In our cases the amount obtained was about 350 to 500 cubic centimeters and was highly albuminous. Filarial embryos were usually found in great numbers in this fluid.

Glands of the groin.—Although some enlargement of the glands of the groin was present in nearly every instance, but three cases were observed, answering the classical description of varicose groin glands. The patients were all men, 40 to 50 years old, and in each case other manifestations of filarial disease coëxisted. The glands involved were the superficial inguinal, lying above and parallel to Poupart's ligament, and the disease was bilateral in all of the cases observed. The swelling was larger than that of the ordinary bubo, and was hard, without fluctuation, and could be felt to be separated into a small number of detachable masses. It was painless and not tender to the touch. The subjacent skin was freely movable over the mass, which, however, was firmly fixed to the deeper tissues. Attempts were made to obtain fluid from these glandular masses with a hypodermic needle, but with the exception of a little blood and serum nothing could be withdrawn. No history of an acute inflammation in these glands could be obtained from any of the patients, except that during the attacks of lymphangitis in the legs, they were tender.

III. FILARIASIS.

Examination of the blood of these patients showed the presence of filarial embryos in but three instances. However, it was possible to make examinations extending over the twenty-four hours of the day in only seven of the number. In the other twenty-seven only specimens taken during the daytime could be obtained. Two specimens out of the seven examined, both day and night, had filarial embryos in their blood, while of the twenty-seven whose blood was examined only during the day, one showed the parasite.

A number of examinations were made upon the general population. Of a total of eighty persons examined, filarial parasites were found in the blood of eleven; out of thirty-seven prisoners in the provincial jail at Albay, nine showed the presence of filarial embryos in blood specimens taken at 10 o'clock at night. These were all short-term prisoners from different towns in the Province of Albay. Out of 93 members of the Thirty-second Company, Philippine Scouts, recruited from Bicol Provinces, blood specimens from whom were sent to us by Dr. Warriner, United States Army, nine, or 9.6 per cent were found to be infected.

IV. THE PARASITE.

The filarial embryos present in the blood of these patients were studied both in fresh preparations and by appropriate staining. The parasites, so far as we could make out, were of one variety; the chief features are as follows:

Motility.—In fresh specimens of the infected blood, the parasite was observed to have the usual wriggling, lashing movements, which changed its position, but which could not be called progressive as the movement was accomplished in no orderly manner. It was only by observing that the lashing movements eventually removed the parasite from the field of the microscope that any change of position could be determined.

Size.—The average length of the microfilaria in the fresh preparation is about 0.300 millimeter and in stained specimens about 0.270 millimeter. The average diameter is 0.007 millimeter.

Head.—The head is smooth and hemispherical, surrounded by a notched prepuce having five or six notches. Upon the anterior end of the head is a slightly refractive spot, from which at times is projected forward a short, needle-like process, which is as quickly withdrawn.

Tail.—The tail slopes gradually to a very fine point.

Body.—The body is cylindrical for the greater part of its length, and is marked by the anterior V spot, the central viscus and the posterior V spot.

The anterior V spot is a triangular area, highly refractive, occupying one side of the worm, 0.090 millimeter, on an average, from the anterior extremity.

The central viscus is situated in the posterior part of the central third of the body. It is granular in appearance, but upon focussing carefully a convoluted tube can be seen to occupy this granular mass. The length of the central viscus is about 0.040 millimeter.

Posterior V spot.—We were unable to do more than to make out the presence of such an organ, and were not able to distinguish any details of the structure.

By appropriate staining, a granular, central column is shown occupying the center of the entire length of the worm. This column is broken by occasional unstained areas. The only one which showed at all constantly was situated in front of the anterior V spot, from 0.055 to 0.060 millimeter from the anterior extremity.

The stains which gave the best results in the embryo were gentian violet, Bismarck brown and hæmatoxylin in weak solutions, Borrell's blue and polychrome methylene blue. The latter two, mixed with glycerin, each gave excellent results, not only staining the parasite, but preserving its size and appearance as in fresh specimens.

Sheath.—The embryo has a sheath which exceeds the length of its occupant by one-third to one-half of the latter, but which appears to be tightly applied to the body laterally. Ordinarily it may be observed as a fine flagellum at either end of the embryo, but at times may be seen as a flattened band. Stained specimens show the size and shape of the sheath very well. No movement of the filaria within the sheath has been observed.

Periodicity.—While it was not possible to obtain day and night specimens of blood from all of the cases, a sufficient number were examined at different hours to show that a nocturnal periodicity was the rule. The following table shows the result of the examination of a daylight and a night specimen from all patients from whom we were able to obtain them at both times:

Patient No.	10 p. m.	10 a. m.	Patient No.	10 p. m.	10 a. m.
1	21	0	6	73	0
2	124	1	7	8	1
3	4	0	8	9	0
4	22	0	9	3	0
5	7	0	10	23	0

Method.—In taking these specimens, four rather large drops of blood were placed close together on a slide. They were then run together with a needle, forming a thick, square smear. After being allowed to dry thoroughly, the hæmoglobin was dissolved by placing the slides face downward in a shallow dish of water with each end resting upon a glass rod. When the hæmoglobin was discharged, which took but a few minutes, the slides were quickly run over with a low-power objective while still wet and without staining, the filarial embryo catching the eye immediately as it came into the field.

Blood counts.—Differential leucocyte counts were made upon a number of the subjects of elephantiasis to determine the degree of eosinophilia present. The counts showed an average of little less than five per cent, the highest being 8.5 per cent and the lowest 1 per cent. The other leucocytes were present in the normal proportion. The percentage of eosinophiles in filarial disease is usually given higher than this, but here we are dealing with many old cases from whose blood the filaria had long since disappeared, and it is not to be expected that as high an average of eosinophilia would be found as in more recent infections.

V. MOSQUITOES.

The following is the list of the mosquitoes reported from the post of Camp Daraga, the identification having been made by Miss Ludlow of the laboratory of the Surgeon-General, United States Army: *Mansonia uniformis* Theob., *Stegomyia fasciata persistans* Banks, *Uranotænia cæruleocephala lateralis* Ludlow, *Culex microannulatus* Theob., *Culex gelidus* Theob., var. *cuneatus*, *Myzorhynchus barbirostris* V. d. W., and *Myzorhynchus vanus* Walk., the latter two belonging to the Anophelinæ. With the exception of *Culex microannulatus* none of the mosquitoes of this list, so far as we know, have been identified as filaria carriers, though with the limited knowledge that we have, none of these species can with certainty be acquitted of the charge of spreading the disease.

VI. RELATIONSHIP OF FILARIA TO ELEPHANTIASIS.

Prout, at a recent meeting of the London Society of Tropical Medicine, presented a paper in which the theory of filarial infection as the essential cause of elephantoid disease was brought into question. He gave it as his opinion that a majority, if not all the cases of elephantiasis, in the Tropics as in temperate regions, are due to an ordinary streptococcic lymphangitis, aggravated by lack of attention, and he brings forward a formidable array of evidence in support of his position. To be sure, the arguments in support of the relationship between the *Microfilaria bancrofti* and elephantoid disease are few in number: namely, that the *Filaria bancrofti* is a parasite of the lymphatic vessels, and elephantiasis is a disease of the same vessels, and also that the geographical distribution of elephantiasis and filariasis coincide. Our own investigations add their mite of evidence to the generally accepted view that elephantoid disease is directly due to filarial infection. Although our examinations for filariasis have not been very numerous, nevertheless they indicate a higher percentage of infection for the Bicol provinces than has been shown for any other part of the Islands, with probably the exception of the Davao district in Mindanao, and in no other portion of the Archipelago has elephantiasis been encountered in any like degree. Other writers have also observed that the subjects of elephantiasis showed a lesser percentage of filarial infection than the general population. Sir Patrick Manson speaks of finding but one filarial infection among fourteen subjects of elephantiasis, and twenty among seventy-four persons not so affected, all the specimens coming from the same locality. He explains this phenomenon by the view that the production of elephantoid disease results from some injury to the adult filaria, causing her to evacuate her eggs instead of the living embryos into the lymphatic vessels. The eggs, being of much greater diameter than the embryo, can not pass through the lymphatics, but obstruct them instead. Then, either because of the death of the adult worm, or of the clogged condition of the lymphatics, filarial embryos are no longer able to get into the circulation.

VII. TREATMENT AND PROPHYLAXIS.

The household remedies of a people are always of interest to the physician. The popular remedy for acute attacks of the lymphangitis is the leaf of an indigenous plant which the natives call *anonang* (*Cordia blancoi* Vid.). This is first bruised and mixed with salt and then applied to the affected parts. *Azafran* (*Curcuma longa* Linn.), the juice of the root of a local plant, is also commonly used as a local application. Multiple parallel incisions through the skin are also employed for the relief of the swelling, a penknife being used for the operation. The only treatment of elephantiasis observed by us was that of a cord tied around the leg to prevent the swelling advancing higher. (Plate I, fig. 2.) However, quite as futile as the string have been the numerous parasiticidal drugs that have been used from time to time for the treatment of filariasis: thymol, quinine, boric and benzoic acid, sodium benzoate, and numerous others. Scheube records a cure with picric-nitrate of potassium, and reports another by Flint, who used methylene blue for the purpose.

Rest, elevation of the parts, and compression by means of bandages are the means most frequently employed for the treatment of elephantiasis of the extremities. Hot baths and local applications of mercurial ointment are also used with benefit. Surgical measures, such as excision of longitudinal strips of skin, and the ligation and compression of the arteries supplying the part have been proposed, but are of no value and are dangerous as well. The combination of rest, elevation and compression together with injections of thiosinamin has been quite successfully employed by Castellani in Colombo, who, in 1907, reported the result of such treatment on a number of cases. His method of treatment[5] is to keep the patient in bed for a week, in the meantime bandaging the affected part with flannel or rubber bandages, and using massage twice daily. The thiosinamin solution is then injected into different parts of the affected area, 2 cubic centimeters of the solution every day or every other day. After the injections, the part is again tightly bandaged. A month or more of this treatment usually suffices greatly to reduce the affected parts, and the use of a puttee or elastic stocking will keep the swelling down. This treatment is only palliative and the enlargement will return if all compression is removed. The treatment of elephantoid disease of the scrotum is largely surgical and will not be considered here.

The prevention of such diseases is of great interest to us. The only way to insure protection against filarial disease in an endemic locality is by the methods of prophylaxis, based upon our knowledge of the life-history of the parasite. The anti-mosquito measures taken to insure protection from malaria will be equally efficient in warding off filarial disease. In addition, the blood of native servants should be examined after 10 o'clock at night for the presence of filarial embryos, and no person harboring the parasite should be employed about the house. Sporadic cases reported from widely separated sections indicate that these precautions would not be out of place anywhere in the Islands. In the military service it would be advisable to have not only the house servants examined, but also all natives employed in any capacity about the posts, and to prevent those infected from holding any position that would bring them about the posts at night. The routine examination of the blood of recruits for the Scout organizations would keep many men so affected out of the service, thereby removing a source of infection to their fellows. While filariasis of itself is apparently in no way incompatible with the enjoyment of excellent health, the possibilities of its sequelæ should not be lost sight of. The discovery and rejection of these men before enlistment would be the most satisfactory method of prevention.

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[5] *This Journal* (1908), 3, 311.

VIII. SUMMARY AND CONCLUSION.

It is evident that filariasis is not as rare a disease in the Philippine Islands as has been supposed. From our own observations and the fact that seven out of nine previously reported cases of filariasis among the native population have been natives of the Bicol provinces, we are convinced that in these districts we have the largest endemic focus of filarial disease, with, perhaps, the exception of Davao, that exists in these Islands. It is our belief that the microfilaria found in the cases here reported are the *Microfilaria bancrofti,* more commonly known as the *Filaria nocturna,* and that this is the common filaria of the Islands. It is also our belief that all microfilaria heretofore coming under our observation have been examples of this same species.

In conclusion we wish to express our appreciation of the assistance given us by the governor of Albay Province, to the various municipal physicians of the Bicol provinces in general, and to Captain C. C. Collins, Medical Corps, United States Army, medical officer at Camp Daraga, who, by his zeal and energy, assisted us greatly in collecting the material for this investigation.

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ILLUSTRATIONS.

PLATE I.

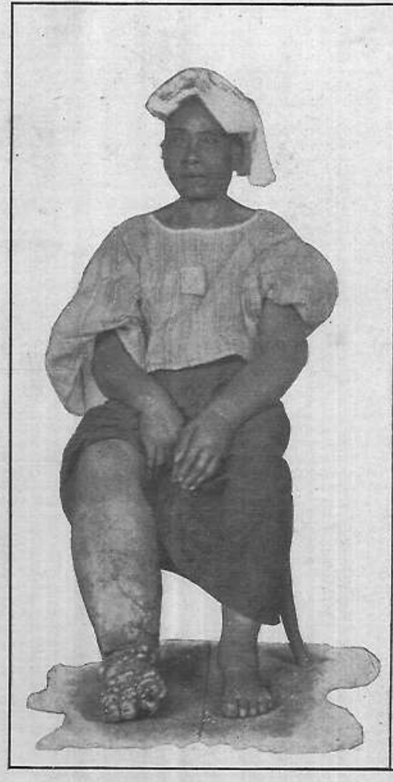
FIG. 1. Elephantiasis of right leg and left forearm. Tuberose growths upon dorsum of foot.
2. Elephantiasis of both legs and scrotum.
3. Elephantiasis of both legs in a boy of 12 years.

PLATE II.

FIG. 1. Elephantiasis of right leg and scrotum, and varicose groin glands. Filarial embryos were found in the man's blood and in the fluid obtained by tapping the scrotum.
2. Elephantiasis of right leg and thigh.
3. Elephantiasis of left leg. Filarial embryos in blood.

PLATE III.

FIG. 1. Elephantiasis of foot and leg, showing warty growth over foot and ankle.
2. Elephantiasis of left leg.
3. Elephantiasis of both legs and scrotum.



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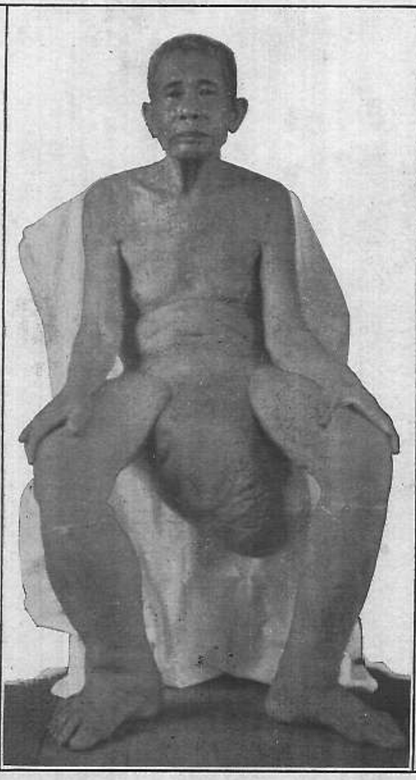

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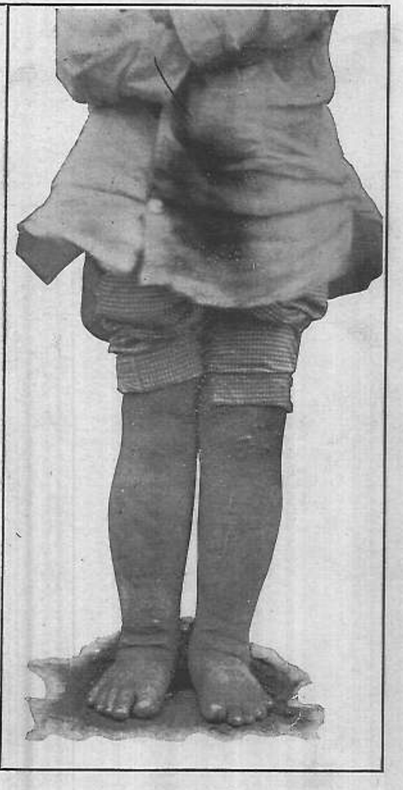

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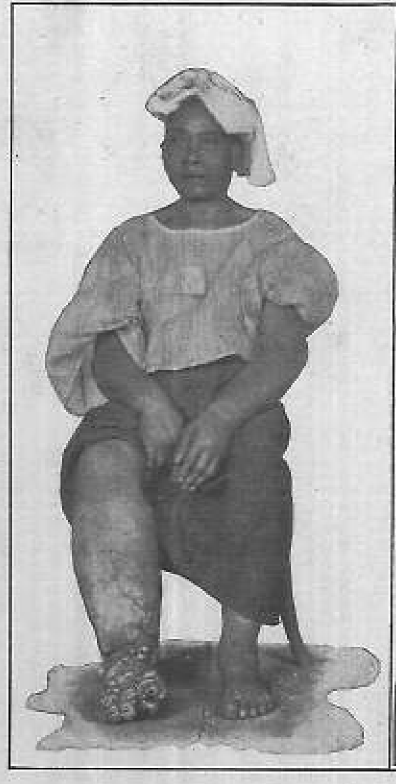

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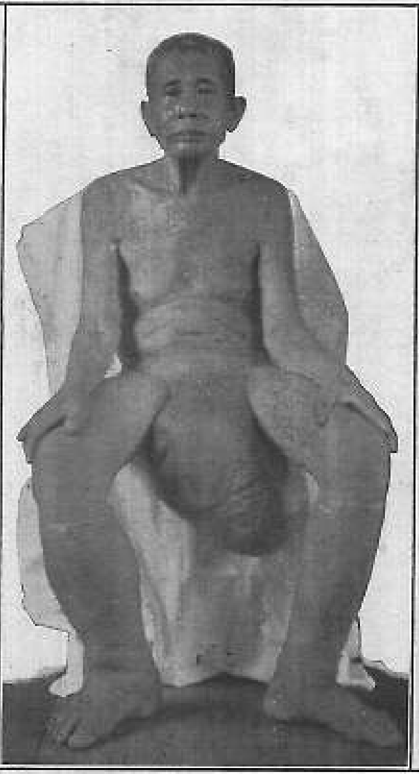

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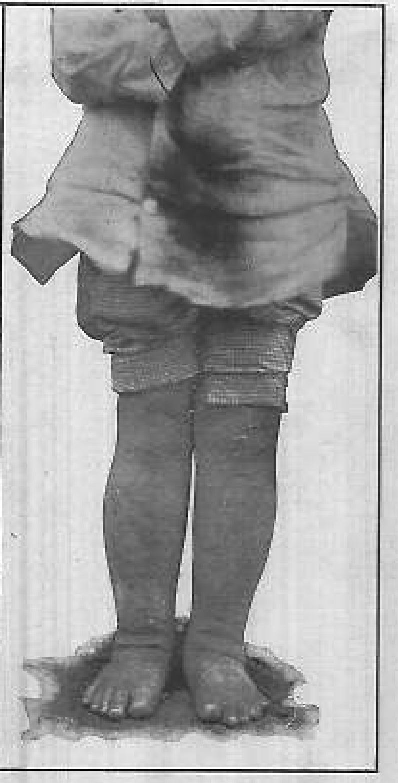

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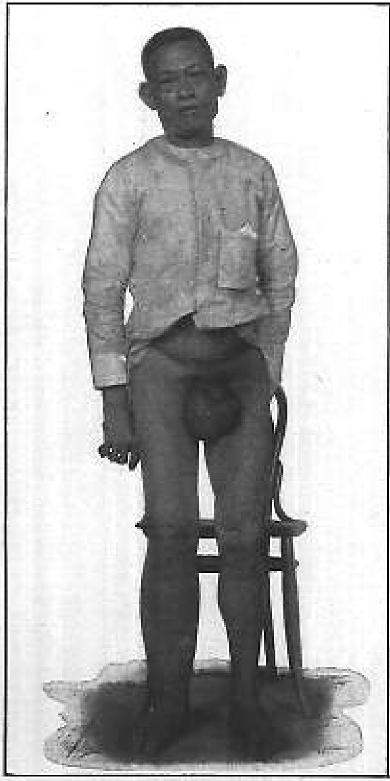

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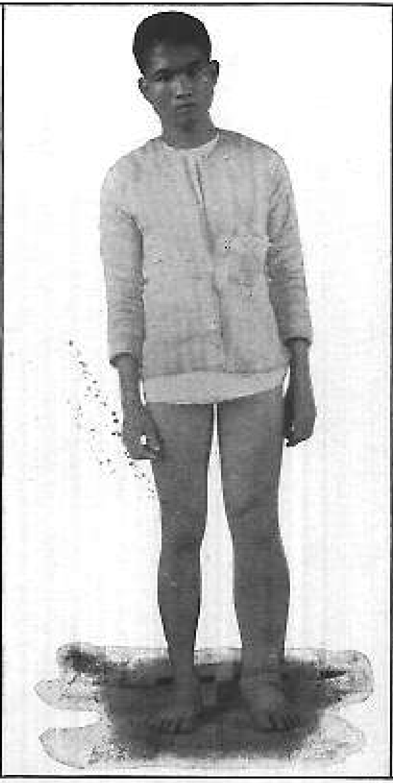

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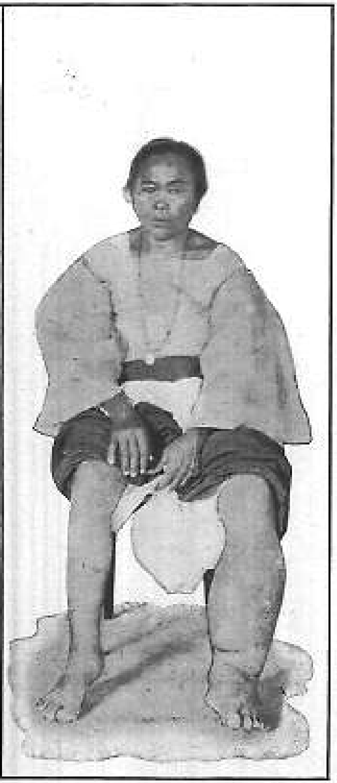

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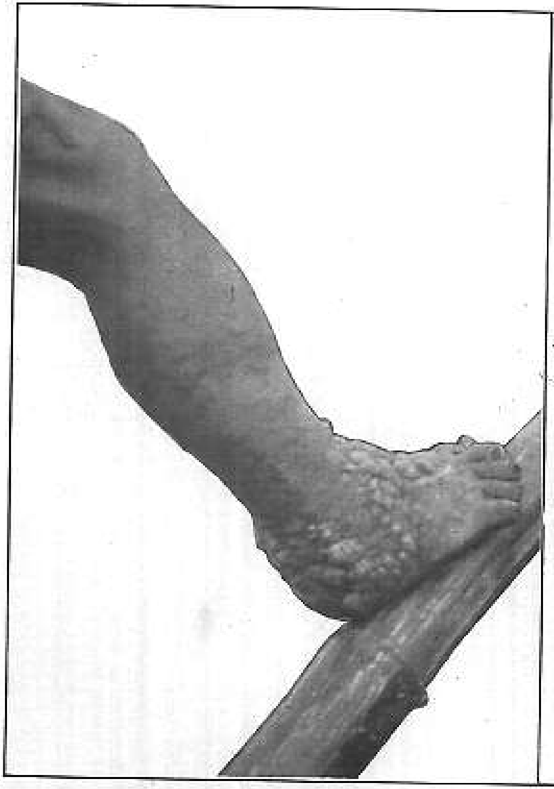

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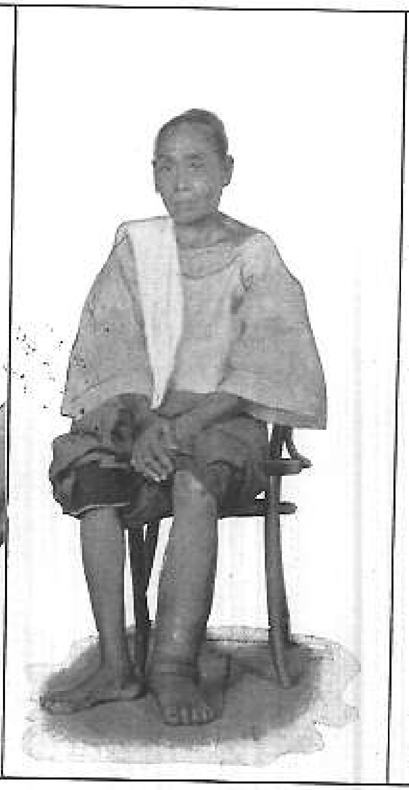

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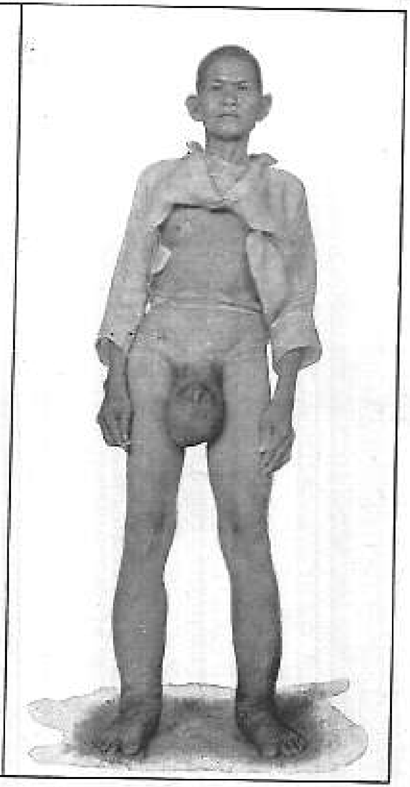

FIG. 3.

PLATE III.

NOTES ON THE DISTRIBUTION OF FILARIA NOCTURNA IN THE PHILIPPINE ISLANDS.

By James M. Phalen and Henry J. Nichols.[1]

The origin of filariasis in the Philippine Islands, as well as that of most other diseases is, and apparently must remain, a matter of conjecture. Anthropologists are not agreed as to whether the Philippines in their island form ever had any original inhabitants or, if so, who they were. However, Foreman states that, at the present time, "the Filipinos are a mixed people, descendants of Papuan, Arabian, Hindoo, Malay, Japanese, Chinese, and European forefathers." *Filaria nocturna* is common in China, India, Samoa, the Friendly and Society Islands, but we have no data to decide from which of these places, if any, the parasite was originally introduced.

Our data on the present distribution of filariasis relate only to *Filaria nocturna,* as this is the only one we ourselves have observed. As we have shown in the preceding paper, southeastern Luzon is a marked focus of filariasis, over 10 per cent of 80 persons from Albay Province being infected. Unpublished reports lead us to believe that the same may be true of Davao, Mindanao, and possibly of the east coast of Samar. Outside of these regions we have the results of the examination of 1,178 of the general population, which are as follows:

Place.	Number examined.	Number infected.	Per cent infected.	Filipinos.	Moros.	Japanese.	Chinese.
Parang	267	6	2.3	114	95	39	19
Cotabato	188	3	1.5	159	29		
Cudarangan	115	6	5.2	115			
Duluan	60	0	0		60		
Overton	113	1	.8	113			
Cebu	208	2	.9	202			1
Manila	232	11	4.8	230			2
Total examined	1,178			933	184	39	22
Total infected		29		25	3	1	0
Total infected (per cent)		2.5		2.6	1.6	2.5	0

Of 74 women, 3.4 per cent were infected.

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[1] James M. Phalen, captain, Medical Corps, United States Army, and Henry J. Nichols, first lieutenant, Medical Corps, United States Army, constituting the United States Army Board for the Study of Tropical Diseases as they occur in the Philippine Islands.

SUMMARY OF CASES.

Parang.—Of 267 residents of Parang, Bacolod, and the quarters near the dock, 6 cases—3 Filipinos, 2 Moros, 1 Japanese—were found infected. Two of the Filipinos were young muchachos who had been employed in officers' families in near-by posts for several years. One, 19 years of age, was born in Misamis and the other, 16 years old, in Cotabato; both had traveled about the island a good deal. The third Filipino, found by Captain Rand, M. C., was employed in one of the infantry companies. He was born in Misamis and had also traveled about the island. The two Moros, 19 and 30 years of age, were quartermaster employees; they were born near Cotabato; all of their life was spent in this section of the country. The Japanese, aged 26 years, had resided in the Philippines for five years, in Luzon for three years and in Parang for two years.

Cotabato.—Of 85 men, Eighth Company, Macabebe Scouts, who had been in Cotabato valley two years, none were found infected. Of 73 men, Forty-second Company, Philippine Scouts, Visayans, 2 infected cases were found by Lieutenant Love, M. C.; both had enlisted several years ago. Among 30 Moro prisoners, one individual, 31 years of age, who had lived near Cotabato all of his life was found infected.

Cudarangan.—Of 92 men in the Forty-fifth Company, Philippine Scouts, Visayans, 4 cases, aged 22, 23, 25, and 26 years, were encountered. All of these were recruits from Ivisan, Panay, Initao and Mambogao, Mindanao, and Cebu. Of 23 women, families of members of the same company; 2 infected cases, aged 17 and 32 years were met with. Both of these had come from Davao a few months before.

Duluan.—Among 60 of Datto Piang's Moros, no cases of infection were encountered.

Overton.—Of 104 quartermaster employees; one individual 19 years old was found infected. He had been in Tacloban for thirteen years, in Manila for one year, and in Overton for five. 9 applicants for Scout service were not infected.

Cebu.—Among 203 prisoners, policemen, and Constabulary, 2 cases were found; 1 a policeman, 26 years of age, a native of Samboan, Cebu, all of whose life had been spent in different parts of the island; the other a woman, aged 26 years, the wife of a man affected with lymph scrotum. Both had lived all their lives near Limao, 6 miles from Cebu.

Manila.—Among 60 employees of the Germinal Factory, Manila; one case aged 16 years was found. He was born in Paco and had always lived there; three other members of the family were not infected. Of 169 prisoners from Manila at Bilibid Prison, 10 cases were encountered; all had been in the prison only a few months. Their ages were from 18 to 36; 4 were born and had lived in Manila; 4 had lived in Manila most of their lives; the other 2 had lived for seven and for two years respectively in Manila. Two were born in Pampanga, 2 in Bulacan, 1 in Negros and 1 in Panay. Two live in Binondo, 3 in Tondo, 2 in Santa Cruz, 1 in Santa Mesa, 1 in Sampaloc and 1 in Intramuros.

These statistics show that a small amount of filariasis is very widely distributed in the Islands. Infections can probably be found almost everywhere, if a thorough and persistent search is made. The most striking feature is the relatively large number of infections in Manila, and the small number among Moros. Datto Piang's men at Duluan are the type of the real natives of the Cotabato Valley and among them no cases of infection were encountered, while at Cudarangan, just across the river, 6 imported cases among the Visayans were found.

None of these cases showed symptoms which could definitely be attributed to filaria, but as noted above, the husband of one of the infected women had a lymph-scrotum and varicose groin glands. (Plate I.) This man, age 27, had noticed a gradual enlargement of his scrotum for nine years. His three healthy appearing children were not infected with parasites.

Periodicity was determined by the examination of specimens taken every two hours for at least one case in each place. The parasite in all showed a marked nocturnal periodicity except in one case at Parang, in which very few filaria could be found at any time either during the day or night. The morphology of the parasite in this case agreed with that observed in all the others.

We wish especially to thank Lieutenants Wiegenstein and Bugbee of Parang; Lieutenant Glass and Dr. Delacroix, of Cudarangan, and Major Dutcher, of Cebu, for assistance in these examinations. A great deal of perseverance and diplomacy was necessary on the part of the officers at Cudarangan, to induce Datto Piang to permit his Mohammedans to be examined; it was necessary to collect the blood from the forearm and not from the ear or finger.

ILLUSTRATION.

PLATE I. Lymph-scrotum and varicose groin glands.

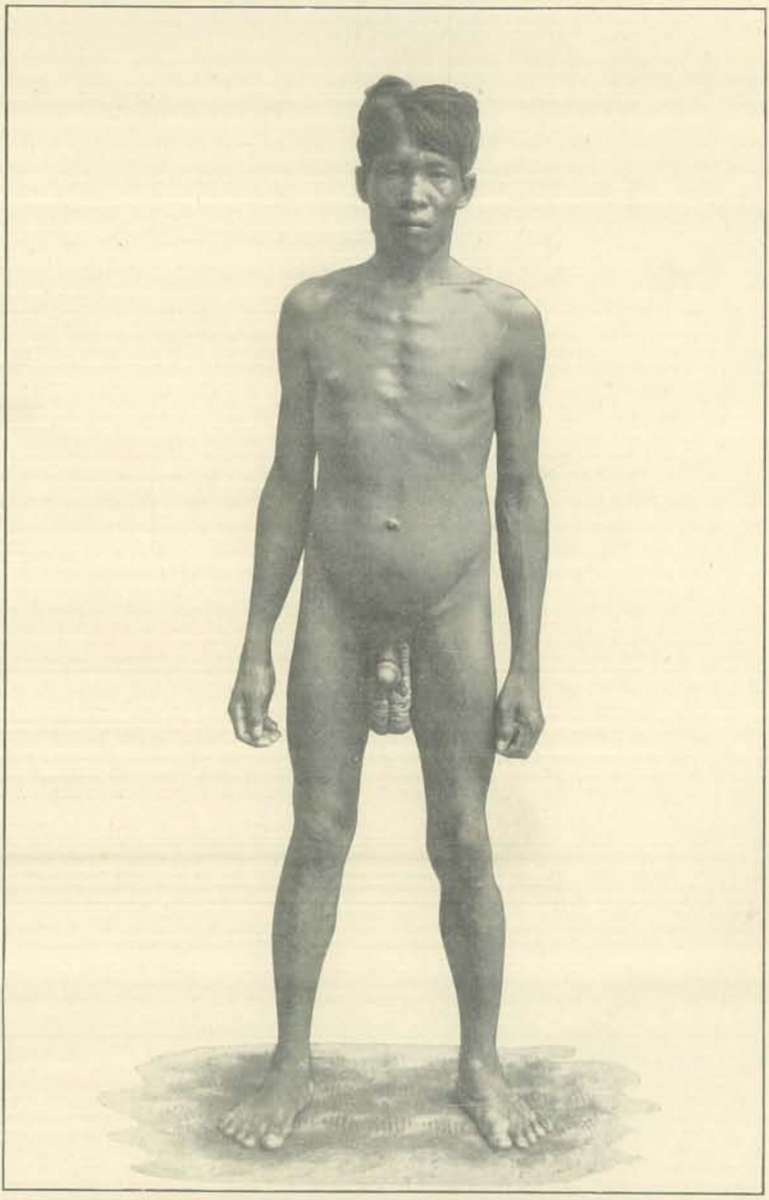


PLATE I.

OBSERVATIONS ON A PALLIATIVE TREATMENT OF ELEPHANTIASIS.[1]

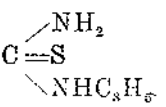
By Aldo Castellani.[2]

Elephantiasis is considered to be an incurable infection except in those cases where the scrotum is affected or where there are localized, pendulous tumors which may be treated surgically. For some time past I have been experimenting with a view to devising a palliative treatment for this disease, which is extremely common in some parts of the tropics. At first, following the example of my predecessors, I tried injections of various antiseptics with the idea of destroying the organism which causes the disease.

The chemicals experimented with were the following:

1. Methylene blue, given by the mouth as well as by subcutaneous injections.
2. Solutions of bichloride of mercury, carbolic acid, cyllin, and other antiseptics given hypodermically.
3. Various arsenical compounds: cacodylate of sodium, of quinine, etc., given by the mouth and by subcutaneous injections.

The result of the investigations was negative and not the slightest improvement was ever noticed in any case. It then occurred to me that since one of the anatomical features of elephantiasis is the enormous increase of the fibrous tissue, thiosinamin might be useful in the treatment of the disease, especially in case of long standing. It is well known that thiosinamin, according to Hebra, Van Hoorn, Lengemann, etc., has the power of softening various kinds of fibrous tissue, facilitating its absorption, although the mechanism of this action is not known.

Thiosinamin was discovered in 1828 by Berzelius; it is obtained by treating two parts of mustard essence with one part of absolute alcohol and seven parts of ammonia, heating at 40° for several hours, and then slowly cooling. The chemical formula of thiosinamin is,  $\mathrm{C}{=}\mathrm{S}\begin{cases}\mathrm{NH_2}\\ \mathrm{NHC_3H_5}\end{cases}$

The crystals of thiosinamin have a bitter taste, a garlic-like odor and are easily soluble in alcohol and ether, but not in water. Thiosinamin, in addition to its peculiar softening action on various fibrous tissue, possesses also some antiseptic properties. Thiosinamin injections are very painful and I have therefore used fibrolysin, which is a water soluble combination of thiosinamin with sodium salicylate, prepared by Mendel and manufactured by Merck. Fibrolysin can be obtained in sterile glass ampullæ, each containing 2 cubic centimeters of liquid corresponding to 0.2 gram of thiosinamin.

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[1] Read at the Fifth Annual Meeting of the Philippine Islands Medical Association, February 29, 1908.

[2] Director of the clinic for tropical diseases, Colombo, Ceylon.

I may state at once that the simple injection of thiosinamin without rest, massage, and most important of all, proper systematic pressure is not conducive to improvement.

TECHNIQUE OF THE TREATMENT.

The patient is first kept at complete rest in bed for a week, the affected parts bandaged with flannel or India rubber, and massaged regularly twice daily; they do not show much improvement as regards size after these manipulations, but they become somewhat softer. Next I begin injecting thiosinamin. I make the injections in various parts of the affected regions, using ordinary antiseptic precautions. I use an antitoxin syringe supplied with a strong needle. A sterile pad of gauze is applied at the place of the injection and the whole limb is tightly bandaged with flannel. To increase the pressure, pads of inelastic material, like stiff compressed gauze or boiled cotton wool or wood or iron bars, may be applied on the more prominent or harder parts, before bandaging. In some cases an elastic rubber bandage is applied for one hour two or three times daily over the flannel bandages directly over the skin.

The injections are almost painless; after two or three hours there may be a little pain locally, and the following day the part may feel harder than before, but in the successful cases, after two or three days the spot where the injection was made and the parts surrounding it become softer. As regards dosage, I generally inoculate 2 or 3 cubic centimeters of fibrolysin every day or every other day, according to the features of the case, for about a month, and then discontinue the injections for a week, during which time the use of flannel and India-rubber bandages is continued. The India-rubber bandaging is most useful in cases of elephantiasis verrucosa, because it has no action on the deep lesions of the disease, but renders the skin much smoother, the hard verrucose-like projections disappearing or becoming smaller. The disappearance of the hard, corneous formations is facilitated by applying before bandaging a spirit lotion containing resorcin and salicylic acid, 10 grams of each to thirty of rectified spirit. After a week or ten days, a second course of thirty or more injections is given; then again a week's rest with rubber bandaging, followed by another course or several other courses of injections. It is to be noted that while rubber bandages are very useful in elephantiasis verrucosa, they are of very little advantage and occasionally may do harm in those cases of elephantiasis which present a smooth skin.

After this treatment, the affected parts, in successful cases, are of much smaller size, although the enlargement of the bones so frequently found does not decrease. The skin becomes softer, more elastic, and can be pinched up in folds.

At this stage, when most of the subcutaneous tissue has been absorbed, I suggest the surgical removal of the portions of the redundant skin, when the disease affects the legs. Long elliptical strips of skin and the subcutaneous tissue are removed and the margins of each wound stitched together. This would not be practicable before the medical treatment, as the coaptation of the opposed surfaces of the skin, they being enormously thickened and elastic, would not be feasible. When the wounds have healed, the patient is advised to wear elastic stockings and every night for an hour, an elastic bandage.

CASES TREATED.

CASE. 1. *Elephantiasis verrucosa of the right leg.*—Ganegada Singhappu, Singhalese, 18 years old, admitted to the clinic January 2, 1907. The first symptoms of the disease appeared twelve years ago, when he suffered from repeated attacks of fever accompanied by painful temporary swelling of the right leg. Later on the enlargement of the leg became permanent, increasing gradually to such an extent that the patient had to give up his work. He was an indoor servant.

At the time of admission the whole limb below the knee was greatly enlarged, the skin being thickened, hard, and rough; on the dorsum of the foot and toes, numerous, horny, hard prominences were present. The limb measured round the ankle, 23½ inches; round the calf, 25½ inches; the inguinal glands were not enlarged, the scrotum and the left leg were not affected. No filariæ were found in the blood.

The patient was first kept in bed for two weeks with the right leg slightly elevated and tightly bandaged with flannel. Massage was given twice daily. At the end of the two weeks the parts were slightly softer, but the dimensions of the leg were practically the same. The thiosinamin treatment was then begun using the precautions already mentioned.

The patient received altogether sixty-two injections. During the last period of treatment the limb was very tightly bandaged for one hour, three times daily with a rubber bandage. At the end of the course of the injections, the condition of the affected leg was strikingly improved, the circumference of the ankle being reduced to 9½ inches, and of the calf to 12 inches. Moreover, the skin had become soft and of almost normal elasticity.

The patient, finding himself so much improved and able to walk easily, whereas when admitted he could scarcely move without help, asked to be allowed to leave the clinic temporarily to go to his village where he had some business to transact. I told him to use a flannel bandage continuously, and to come to the clinic at the earliest practicable date. He returned two weeks later, confessing that he had never used the bandages given him. The lower parts of the leg and the foot were much enlarged (circumference of the ankle 12 inches), œdematous and soft. After twenty-four hours of complete rest in bed and rubber bandaging, the swelling disappeared, and the measurements of the limb gave the same results as when he had left.

The patient remained in the clinic for several weeks more without having any more thiosinamin injections. The use of a rubber bandage was, however, regularly continued; the size of the leg increased very slightly. In July I advised him that long elliptical strips of the redundant skin should be removed.

I asked Dr. Paul, surgeon to the General Hospital, to perform the operation and he very kindly consented to do so. The operation took place on the 10th of July. The patient was given chloroform and, after a thorough disinfection, a long elliptical strip of the skin and subcutaneous tissue was removed from the anterior part of the leg and dorsum of the foot. The margins of the wound were brought into contact by means of an interrupted suture. The stitches were removed after eleven days. The wound healed rapidly. Three weeks later another strip of skin was similarly removed from the posterior region of the leg. This wound also healed quickly. The patient left the hospital in the latter part of August, but has been seen by me regularly. So far, five months after the first operation, the leg is not enlarged; he has been regularly wearing an elastic stocking and at night has used a rubber bandage for an hour after having massage applied. If he does not wear the elastic stocking, and does not employ the bandage, the lower part of the leg becomes somewhat swollen and œdematous, although much less by far than before the operation.

CASE. 2.—The patient, a private case, consulted me in October, 1906. He was suffering from elephantiasis of the right thigh, leg and foot, of twenty years' duration. The skin of the lower part of the leg and foot was extremely hard, inelastic, and covered with numerous small, wart-like protuberances.

Measurements: Round the ankle, 24½ inches; round the calf, 27 inches; round the thigh, 25 inches.

The patient underwent a treatment of ninety thiosinamin injections, combined with complete rest in bed, the use of the flannel bandages at first, and the India-rubber bandages later. The case improved greatly, the skin becoming softer, more elastic, and much smoother. The circumference round the thigh was reduced to 21 inches, round the calf to 16 inches, and round the ankle to 14½ inches. The patient was able to walk with much greater ease and following my instructions, has been wearing puttees and has continued regularly the use of the rubber bandaging twice daily for an hour. He states that if he stops the bandaging and the wearing of puttees, even for two or three days, the leg becomes swollen and œdematous; the swelling disappears, however, after a few hours, rest and bandaging. He refused operation and has not been seen by me lately.

CASE 3.—The patient, a private case from India, had elephantiasis for fifteen years, confined to the lower part of the left leg and foot. He underwent a course of fifty-six thiosinamin injections, combined with rest, massage, and the use of the rubber bandages. The improvement was very slight; the skin became somewhat smoother, but the dimensions of the affected parts remained practically the same. I think that rest, massage, and bandaging alone, without the injections, would have induced the same improvement.

CASE 4.—Singhalese woman, aged 56; admitted to the clinic April 2, 1907. The disease was of fifteen years' standing, and was localized in the lower two thirds of the left leg and in the foot. The skin was thick and inelastic, but not so rough as in the other cases. Circumference round the ankle, 19 inches.

The woman was kept in bed for ten days, and the parts bandaged with flannel bandages; after this treatment the skin became softer, but the dimensions of the limb remained practically unchanged. I then began giving thiosinamin injections. After having received thirty-five injections, she left the clinic at her own request, wishing to visit her family in a distant village. She was better at the time of leaving, the dimensions of the foot and leg having greatly decreased. When the patient was admitted to the clinic she could not move her toes; on leaving, such movements could easily be made.

CASE 5.—Bennet Gregory, Singhalese boy, aged 10 years; admitted to the clinic on June 25, 1907. Three years ago the patient began suffering from attacks of fever with contemporary swelling of the left leg and of the lymphatic inguinal glands of the left side. On admission, the left leg and foot were greatly enlarged, the skin being thick and hard, but with a smooth surface. The lymphatic inguinal glands of the left side were slightly enlarged and hard. The maximum circumference of the calf was 14½ inches.

Treatment was begun on June 28, 1907. He received twenty-five injections and the limb was regularly tightly bandaged with flannel and for one hour every other day with rubber bandages. On July 23 the injections were discontinued; they were resumed on the 29th of the same month. During the interval only massage and the use of India-rubber and flannel bandages were continued. After the first twelve injections a distinct improvement was noticeable, the parts having become softer and the size of the limb decreased. On July 15 and 16, however, the affected parts again became enlarged and very hard, although there was no fever. This condition lasted for three days, when on the 17th the improvement again began and steadily continued.

At the time of writing (January, 1908) the improvement is well marked, the maximum circumference of the calf being 7 inches. The skin is much more elastic and can be pinched up in folds almost everywhere. I hope it will soon be possible to perform the same operation as in *Case 1*. It is to be noted that the patient remained without any treatment during November and December, 1907, as his parents took him back to their bungalow.

CASE 6.—*Elephantiasis verrucosa of the right leg.* Vekanda, Singhalese man 40 years of age. Admitted to the clinic on September 3, 1907. The disease was of fifteen years' standing; the right leg and foot were enormously enlarged, the maximum circumference of the calf being 28½ inches; the skin was thick, inelastic, and covered with numerous, hard, corneous projections; the lymphatic glands of the right side were enlarged and hard; the scrotum was not affected. Numerous *eosinophiles* (15 per cent), but no *Filaria nocturna*, were encountered in the blood.

Treatment was started on the 9th of September, 1907; the patient up to the present time (January, 1908) has received seventy-five thiosinamin injections. He remained without treatment during the month of November. The whole limb has been regularly bandaged, flannel pads, etc., being applied. The case has much improved; the maximum circumference of the calf now being 16 inches and the skin has become much softer. I propose to continue the treatment for one month and then, if the skin has become elastic, the same operation as in *Case 1* will be performed.

CONCLUSIONS.

1. The treatment I have devised for elephantiasis, namely thiosinamin (fibrolysin) injections and methodical bandaging, followed by removal of portions of the redundant skin when most of the subcutaneous tissue has been absorbed, is of utility in a certain number of suitable cases.

2. I am not yet in position to give any definite explanation on the mode of action of the treatment, which I consider only palliative. Probably thiosinamin acts by softening the fibrous tissue so profuse in elephantiasis, and possibly, the antiseptic properties of thiosinamin, though very slight, may play a certain role. An observation which, if confirmed, may throw some light on the question, is that in the majority of my cases (five out of seven), the thiosinamin injections induced a fairly well-marked, though transient, leucocytosis; in one case (Case 1) the number of leucocytes rose from 9,000 to 17,500 per cubic millimeter.

It is to be noted that the thiosinamin treatment without a constant, well-distributed pressure on the affected parts, best obtained by the application of hard pads and by careful bandaging, does not cause any marked improvement.

Constant pressure on the affected parts by means of bandaging, etc., *without* thiosinamin injections, has practically no effect in severe chronic cases, although it may be of temporary benefit in recent ones.

ILLUSTRATIONS.

PLATE I.

FIG. 1. Elephantiasis. Case 5, before treatment.
2. The same, after five months' treatment, no operation.

PLATE II.

FIG. 1. Elephantiasis. Case 6, before treatment.
2. The same, after four months' treatment, no operation.

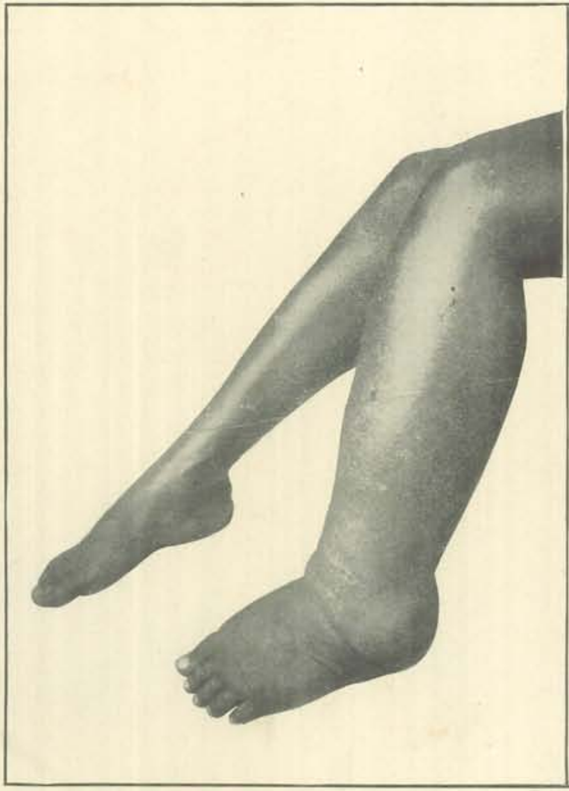

FIG. 1.

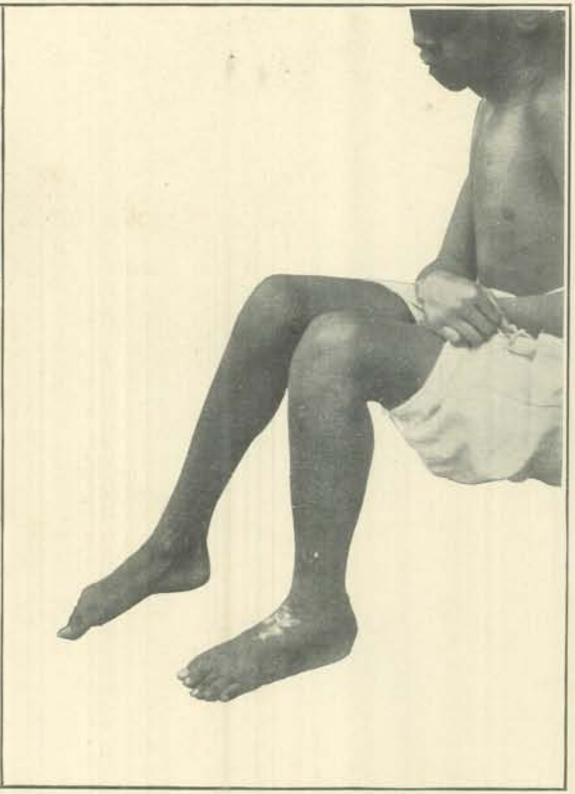

FIG. 2.

PLATE I.

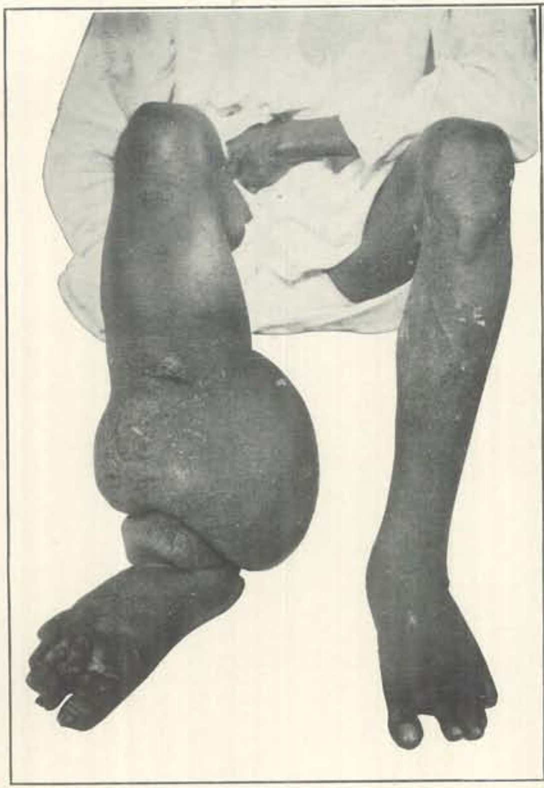

FIG. 1.

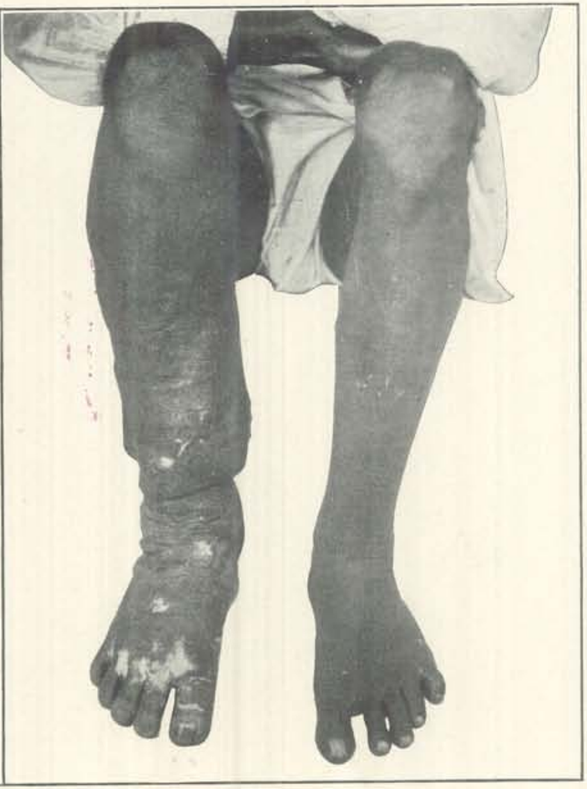

FIG. 2.

PLATE II.

FURTHER FILTRATION EXPERIMENTS WITH VIRUS OF CATTLE PLAGUE.

By E. H. Ruediger.

(From the Serum Section of the Biological Laboratory, Bureau of Science, Manila, P. I.)

It was shown in a previous report[1] that the laked or unlaked blood and the bile of bullocks sick with cattle plague, lost the power of transmitting the disease to other animals after being passed through Berkefeld filters marked V, N or W; while peritoneal fluid retained this property on being passed through either one of these filters.[2]

It was considered necessary to repeat the experiments with peritoneal fluid with all possible precautions, owing to the danger of accidental infection of the animals used for the previous experiment. The bullocks used in the former experiments were kept in a fly-proof stable and so far as could be determined, there was no cattle plague within a radius of three miles, neither did the attendants, feed, utensils, etc., come in contact with animals suffering from that disease, nor with excreta from such animals.

The results here reported were obtained with peritoneal fluid after it had been passed through one of the following filters: Berkefeld N, Berkefeld W, Chamberland F, and Chamberland B. Five liters of citrate solution (the addition of 0.5 per cent solution of potassium or sodium citrate became necessary to prevent subsequent clotting of the fluid) was injected into the peritoneal cavity of a bullock sick with cattle plague. About one hour later the animal was bled to death, the abdomen opened and the peritoneal fluid collected.

EXPERIMENTAL.

No. 1. Peritoneal fluid obtained as above on the 13th day of January was divided into two parts, *a* and *b*. Fifty cubic centimeters of part *a*, unfiltered, were injected under the skin of bullock No. 27. The temperature of the bullock rose rapidly three days later, and on the 18th day of January, five days after inoculation, the animal was bled to death and the lesions found post-mortem were those characteristic of cattle plague. (See Chart No. 27.)

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[1] *This Journal* (1908), 3, 165.

[2] The Berkefeld filters V, N, and W are coarse, medium, and fine grained, respectively. The filter marked W, the finest grained Berkefeld filter, is considerably coarser than the Chamberland filter marked F.

Part *b* was passed through a Berkefeld filter marked N and 50 cubic centimeters of it injected under the skin of bullock No. 28. Cattle plague set in on the fourth day and the animal was bled to death on the sixth day after inoculation. (See Chart No. 28.)

Bullock No. 48, kept as a control, was not inoculated; it remained well. (See Chart No. 48.) Fifty cubic centimeters of unfiltered fluid were injected on the 11th day of March. The animal sickened with cattle plague and was bled to death on the fifth day after inoculation.[3]

No. 2. Peritoneal fluid received on the 11th day of March was divided into four parts: *a*, *b*, *c*, and *d*. Part *a* remained unfiltered; part *b* was passed through a Berkefeld filter marked W; part *c* was passed through a Chamberland filter marked F; and part *d* was passed through a Chamberland filter marked B.

Bullock No. 48 received subcutaneously 50 cubic centimeters of part *a*. It sickened with cattle plague. (See Chart No. 48.)

Fifty cubic centimeters of part *b* were injected under the skin of Bullock No. 68 which sickened with cattle plague and was bled to death on the fifth day after inoculation. (See Chart No. 68.)

Bullock No. 69 was inoculated with 50 cubic centimeters of part *c*, and showed an irregular temperature for some time following the inoculation, but there was no manifestation of cattle plague. (See Chart No. 69.) On the 27th day of April, 50 cubic centimeters of unfiltered peritoneal fluid were injected under the skin of this animal which sickened and was bled to death on the 3d day of May, six days after inoculation. The diagnosis of cattle plague was verified post-mortem. (See Chart No. 69.)

Attention was called in my previous report to the fact that Nicolle and Adil-Bey and Yersin found that the etiologic factor of cattle plague may at times pass through the pores of the Chamberland filter marked F, probably due to difference in the size of the pores in different filters. Considerable variation is found in the stream of water from a number of filters, supposed to be of the same grade, such as Chamberland F for instance, delivered by them under identical conditions as shown by the following test:

Five new Chamberland filters were tested with distilled water. The first delivered a liter of filtrate in five minutes, the second one in eight minutes, the third in eighteen minutes, the fourth in eleven minutes, and the fifth in sixteen minutes. Hence, one can easily understand how different results may be obtained with filters of the same grade. As only one Chamberland F filter was used in this experiment on cattle plague, the result must not be considered conclusive.

Fifty cubic centimeters of part *d* were injected under the skin of bullock No. 70. It remained well. (See Chart No. 70.) On the 27th day of April this animal was inoculated with 50 cubic centimeters of unfiltered peritoneal fluid. Cattle plague followed. (See Chart No. 70.)

Bullock No. 71, kept as a control, was not inoculated and remained well. (See Chart No. 71.) The immunity test was applied on the 27th day of April and cattle plague followed the injection of 50 cubic centimeters of unfiltered peritoneal fluid. (See Chart No. 71.)

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[3] Charts Nos. 27, 28, and 48 show a decided rise of temperature on the 9th day of January. On this date the animals were driven a distance of three miles to the laboratory of the Bureau of Science, but it was a very warm day and the animals, practically wild, became overheated.

CONCLUSIONS.

The following conclusions seem justified from the experiments previously reported and those here recorded:

1. Blood, laked or unlaked, and bile of animals sick with cattle plague, lose their virulence on being passed through Berkefeld filters marked V, N, or W.

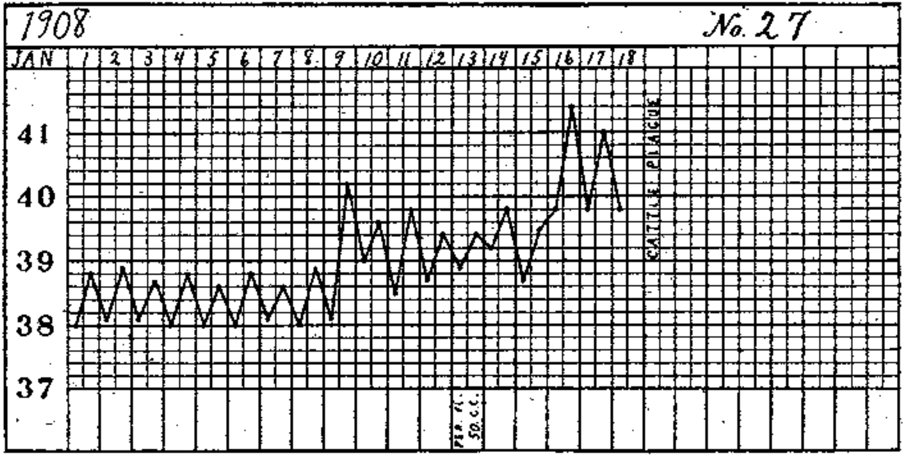
2. Peritoneal fluid retains its virulence on being passed through Berkefeld filters marked V, N, or W, but is harmless after having been passed through a Chamberland filter marked B.

3. Conclusions relative to the Chamberland filter marked F will be reserved for the present. It is intended to test a larger number of these filters when opportunity permits, and the results therefrom will be reported later.

I wish to express my gratitude to Dr. Nesom, Director of the Bureau of Agriculture, and to Dr. Shealy, of the same Bureau, for the peritoneal fluid and for the bullocks used in this work.

ILLUSTRATIONS.

Eleven charts.


1908
No. 27
JAN
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
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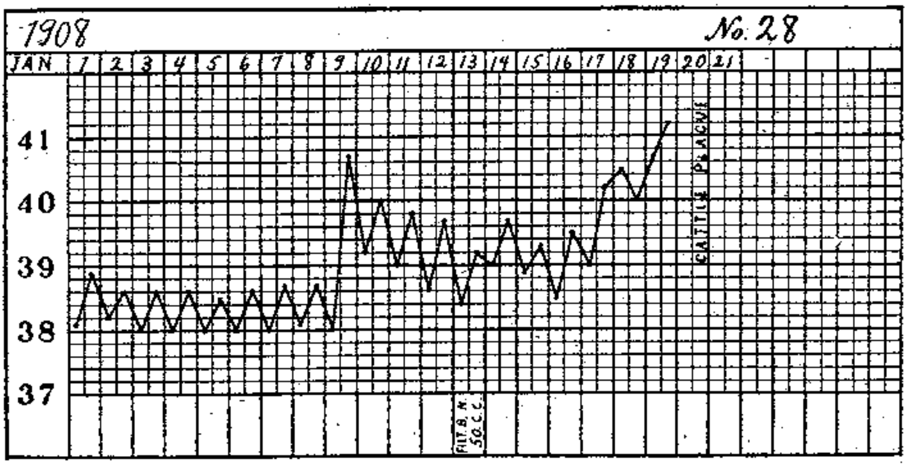
CATTLE PLAGUE
PER. FL.
50 C.C.


1908
No. 28
JAN
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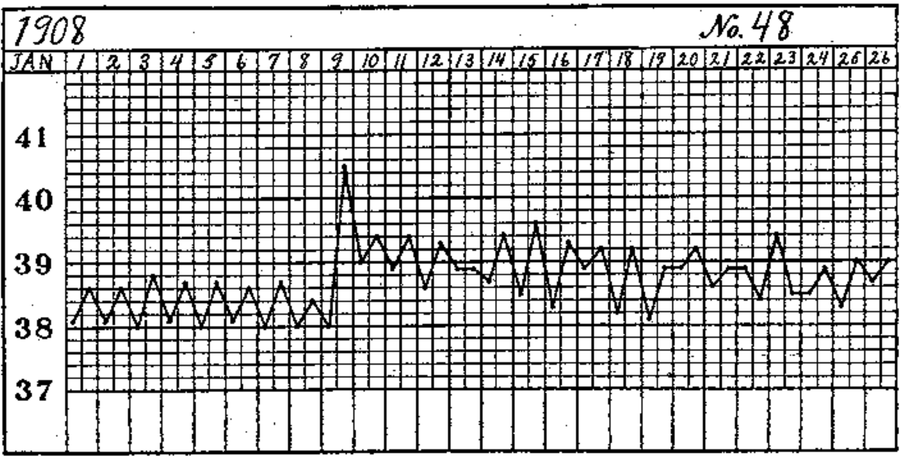
CATTLE PLAGUE
FILT. B. N.
50 C.C.


1908
No. 48
JAN
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 26 26
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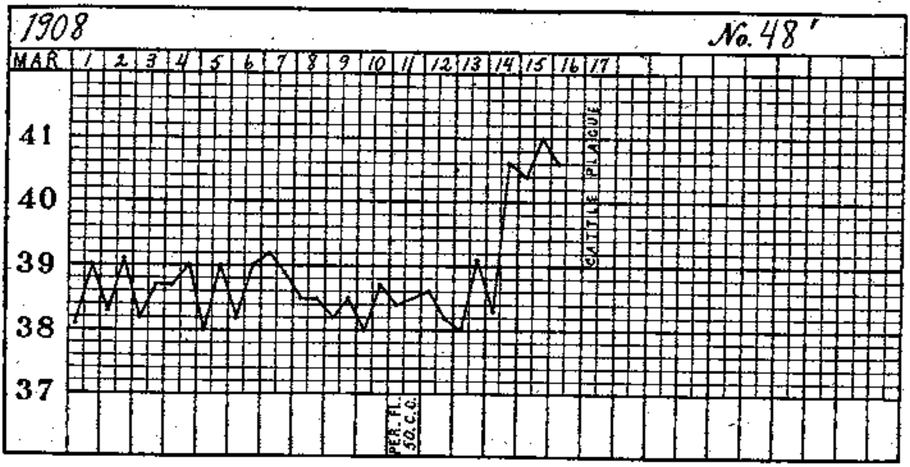
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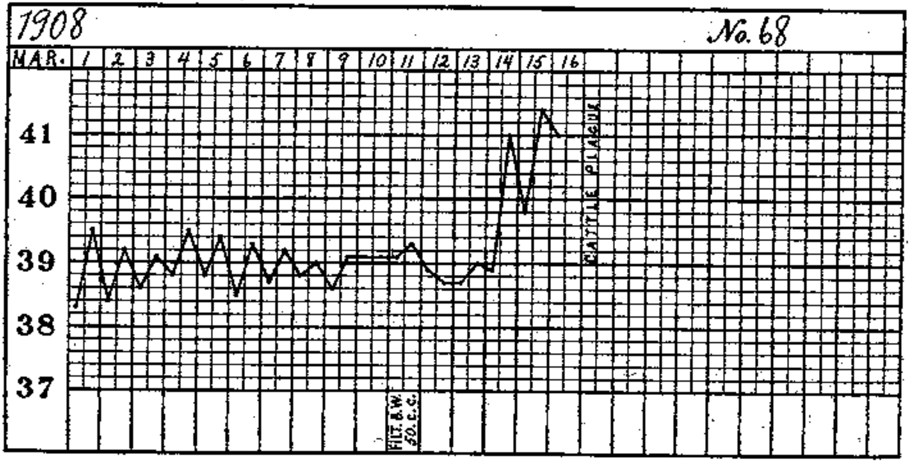
CATTLE PLAGUE
PER. FL. 50 c.c.


1908
No. 68
MAR.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
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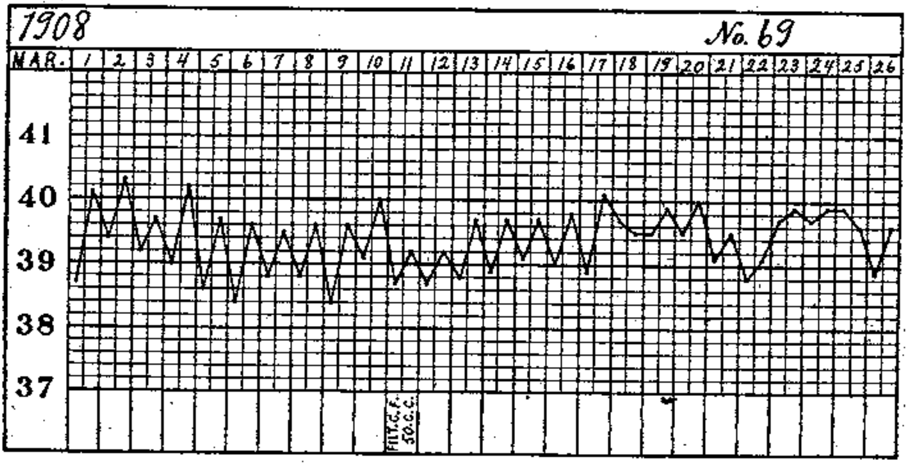
CATTLE PLAGUE
FILT. B.W. 50 c.c.


1908
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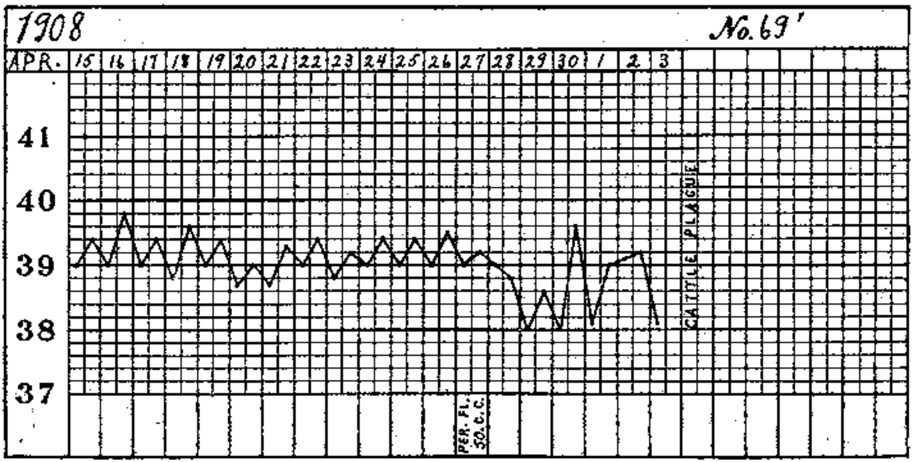
FILT. C.F. 50 c.c.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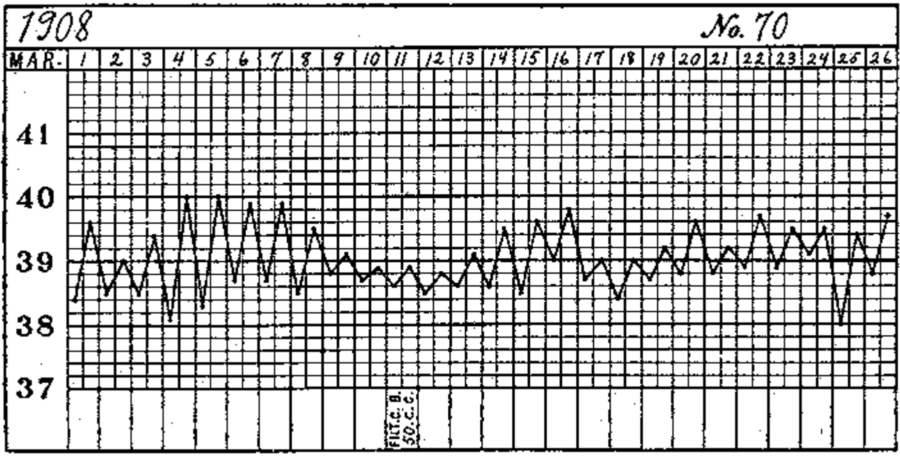
CATTLE PLAGUE


1908
No. 70
MAR.
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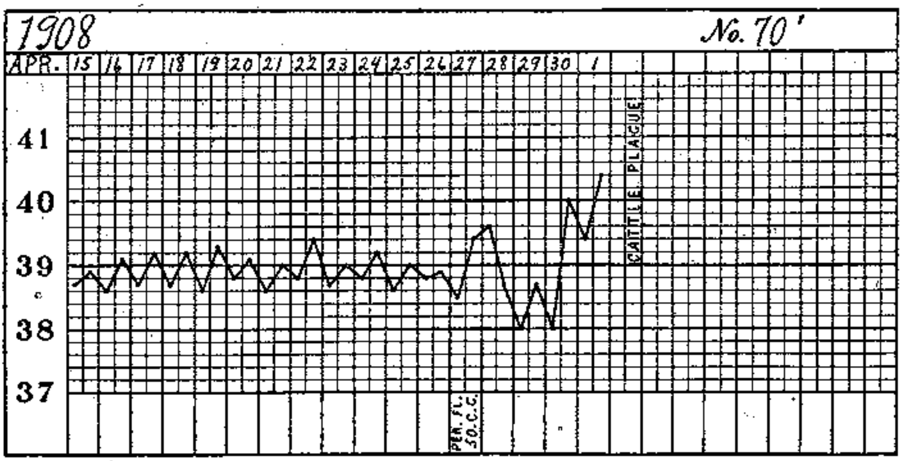
FILT.C.B. 50.C.C.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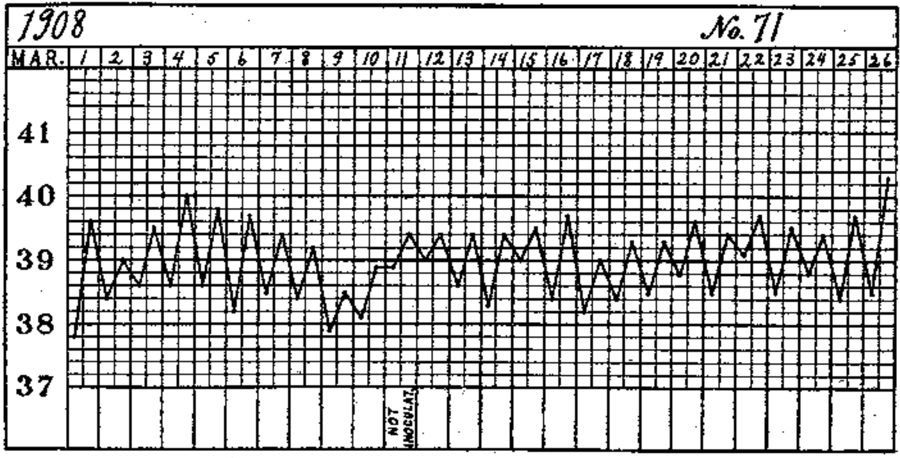
CATTLE PLAGUE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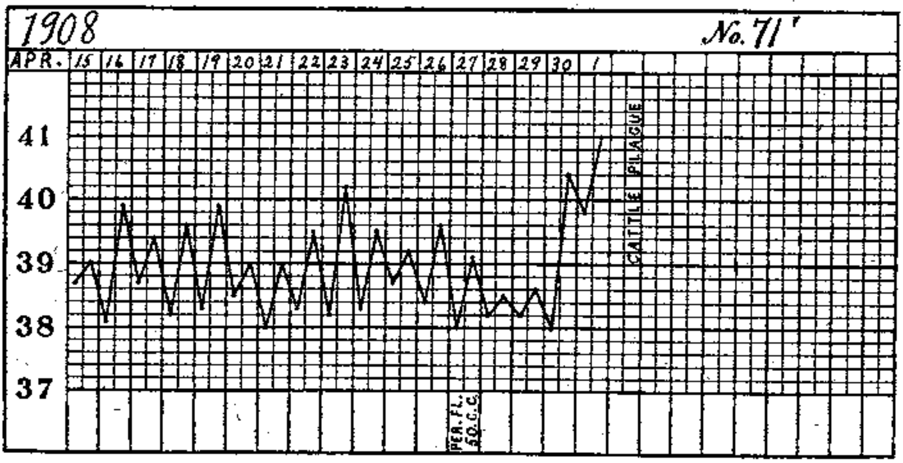
1908
No. 71'
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PER. FL. 50 C.C.
CATTLE PLAGUE

A REPORT OF SEVERAL CASES WITH UNUSUAL SYMPTOMS CAUSED BY CONTACT WITH SOME UNKNOWN VARIETY OF JELLYFISH (SCYPHOZOA).[1]

By Edward H. H. Old.[2]

The cases reported under this title were observed during the summer months of 1906 and 1907. Two were reported from Olongapo; the others occurred in the waters of Cañacao Bay, an offshoot of Manila Bay lying between Cavite and the peninsula opposite, on which is located the United States Naval Hospital.

The first case was seen in 1906 and the account which the patient gave of his symptoms after having been stung by the jellyfish seemed so exaggerated that it was not seriously considered at the time and his actions and complaints were looked upon merely as a marked hysterical attack following an ordinary sting from one of these fish. Not until other cases were observed in 1907, were such symptoms following the sting of a jellyfish looked upon as possibly something peculiar to these waters.

Notes were made on the cases as they were observed. These notes showed a regular symptom complex, and those cases noted independently by medical officers stationed at Cavite and Olongapo go to prove that the symptoms were not accidental.

Case 1.—In August, 1906, a call was received at the hospital stating that a man, who had been in swimming off Sangley Point, had been stung by a jellyfish and was very sick.

A friend who was with him at the time said that the patient, when he came out of the water shortly after he had been stung, complained of pain over his thigh, and soon afterward of pain elsewhere; then he became prostrated and began to vomit, to cough, and to breathe rapidly. On admission to the hospital, an area of erythema slightly raised and streaked and about the size of the palm of the hand was seen on his right thigh; vomiting had ceased, but his respirations were much increased and he continued to cough almost incessantly. The cough was short and hacking in character as if a foreign body had lodged in the larynx, and a thin, mucoid sputum was expectorated. His face was congested and anxious in expression and he wept at intervals. He threw himself constantly about on the bed, seemed to be in great pain and expressed much anxiety as to his condition. As stated above, his actions were looked upon as hysterical, for this was the first case of this nature seen here.

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[1] Read at the Fifth Annual Meeting of the Philippine Islands Medical Association, February 28, 1908.

[2] Assistant surgeon, United States Navy.

The patient was given morphine sulphate, one-fourth grain by hypodermic injection; the local condition was treated with an alkaline solution and was relieved in about half an hour. The next day he felt only a little weak, and otherwise appeared well and reported for duty.

No record of his temperature was kept; the pulse was of good force and the rate slightly increased.

Case 2.—V., a hospital attendant at Cañacao, on June 21, 1907, while in bathing off the hospital wharf was stung by a jellyfish. He said that he was some distance from the landing and, as soon as he felt the sting, he turned back to the wharf; that on his way he felt some pain across his back, but thought it was due to swimming. On his way up from the wharf to the hospital he began to feel badly and sat down for a little while. When he reached the hospital, about thirty minutes after he had been stung, he became prostrated and had to be carried to a bed.

On arrival I found a slightly raised, vesiculated, red area over the left biceps muscle. This "wept" like an eczema. The patient was throwing himself around the bed and coughing almost incessantly, expectorating a thin mucus. He complained of nausea but did not vomit. His face was congested and anxious. He wept at intervals, a stream of tears flowing down his face. The nose was occluded as in a bad case of coryza and from it a thin mucus was discharging. He complained of pain in his head and of marked pain in the lumbar region. He expressed much anxiety as to his condition and exclaimed now and then: "I don't know why, but I've lost all my nerve." His temperature was 38° C. (100°.2 F.); pulse 100, strong and full. The examination of urine and blood showed nothing abnormal.

Morphine sulphate one-sixth grain was given by hypodermic injection, an alkaline solution was applied to the arm. The symptoms subsided shortly after and in a few hours the temperature was normal and the pulse 60. The next morning the patient felt weak and complained of a slight sore throat; the pharynx was slightly inflamed.

Case 3.—S., a hospital attendant on duty at Cañacao on June 24, 1907, while swimming off the hospital wharf was struck by a jellyfish on the left side of his chin. He felt the sting immediately, but had no general symptoms until fifteen minutes later. Knowing the effect in the previous cases he came immediately to the hospital.

There was a small, red-streaked area and a few vesicles on the side of his chin. The symptoms began with sharp, shooting pains throughout the body, but chiefly across the posterior lumbar region. The patient felt nauseated, but did not vomit. The same symptoms of congested mucous membranes, cough with thin mucoid sputum and lachrymation, were present, but he was not hysterical. His temperature was 37°.5 C. (99°.6 F.). No treatment was given. The symptoms lasted two hours.

Case 4.—On the same day as that on which the previous case occurred, M., a hospital attendant, was stung on the right forearm. A raised, red-streaked area appeared covered with little vesicles which "wept." He said that at first his arm felt as if paralyzed and that he could hardly use it to swim. Ten or fifteen minutes later, after reaching the hospital, general symptoms began with sharp, shooting pains throughout the whole body, but chiefly in the back. The patient felt nauseated but did not vomit. There was no cough or excessive lachrymation, nor were hysterical symptoms noticeable. An alkaline solution was applied locally. The symptoms continued for about an hour.

CASE 5.—D., a hospital apprentice, while swimming off the hospital wharf was stung by a jellyfish on his arm. The symptoms appeared in about twenty minutes. I did not see him, but obtained a description of his symptoms, which were exactly like those of the other cases quoted, except that this patient did not have the severe pain in his back nor was he hysterical (this latter fact was obtained from one who saw him). The symptoms lasted two hours. No treatment was instituted.

CASE 6.—This was reported to me by Assistant Surgeon A. B. Clifford, United States Navy. The case came to the dispensary at the United States naval station, Cavite, on July 6, 1907. This patient was a Filipino seaman. He was stung by a jellyfish while in swimming. Slightly raised, red-streaked areas appeared on both arms and neck. He said this happened about an hour before he was seen, but at that time there was marked congestion of the respiratory tract with almost constant coughing and expectoration of a thin mucoid sputum. Excessive lachrymation was present. There was no vomiting or headache. Pain all over the body was complained of, but chiefly in the back. The patient threw himself about the bed in an hysterical manner. The temperature by axilla was 37° C (98°.6 F.). He was given morphine sulphate one-eighth grain by hypodermic injection and sodium bromide by the mouth. The patient became quiet shortly afterwards, but continued to have some pain over the streaked areas and in the back.

CASE 7.—Reported to me by Surgeon D. N. Carpenter, United States Navy, who had the case in charge at the United States naval station, Cavite. This case, H. D., occurred on the afternoon of August 11, 1907. While in bathing off this station the patient says that he was stung by a jellyfish. About fifteen minutes later when he reported at the dispensary the symptoms had already appeared.

Over the region of the right deltoid and scapula there was an erythematous hyperæsthetic area which was covered with perspiration and this would immediately reappear on being wiped off, or rather it "wept." The symtoms noted were: respiratory spasm, holding of the breath for several seconds with short expirations and nervous cough; venous engorgement of the jugular veins from holding the breath. The face was flushed, the skin of the face relaxed and perspiring profusely; the head felt hot; there was a discharge from the nose; the pupils were partially and equally dilated. Pain was complained of in the back and pit of the stomach. Hysterical nervous symptoms manifested themselves by great restlessness and complaint of constriction of the throat appeared. The lungs were clear. The heart was normal. The pulse regular and of good volume, about 80. The temperature was not taken.

Treatment.—The remedy advocated by the natives was first tried, namely of vinegar externally and sugar internally. This was without effect. Amyl nitrite inhalations were also given without result. Morphine sulphate one-eighth grain by hypodermic injection was administered and in five minutes the patient complained of no pain and the restlessness and hysterical symptoms had subsided.

The following cases were reported to me by Surgeon C. P. Kindleberger, United States Navy, they having come under his observation at the United States naval station, Olongapo:

CASE 8.—The patient was a Filipino boy, 14 years old, who was seen on July 16, 1907. He was stung on the right forearm by a white jellyfish; a red welt was seen over the effected area. He cried with pain, was restless and became partially unconscious. The lesion was treated locally with applications of alcohol and internally with a solution of sodium bicarbonate with bromides; he became quiet and was apparently in good condition. His father insisted on taking him home and as soon as the patient saw the water he again became hysterical. Shortly after he reached home a call was received for some one to see him, to which a hospital steward responded; he reported that the boy's heart and respiration showed signs of failure, and that he gave stimulants both by mouth and hypodermic injection, but these had no effect and the boy died at 7.30 p. m., just three and a half hours after he was stung.

CASE 9.—An American woman was stung on both forearms and hands by a jellyfish. The fingers of one hand became so swollen that a ring caused considerable constriction of the tissues. In this case there was severe pain locally; pallor from pain and fright; the pulse was weak. The patient did not sleep well for several nights because of the pain. Under lead and opium lotion the red welts and swelling began to disappear, but about three days after the sting an eruption resembling lesions of poison oak appeared on both arms and responded to treatment by fluid extract of grindelia robusta. No other symptoms were noted in this case.

The reason more cases were not seen is probably due to the fact that few if any of the men at the hospital went swimming in 1906, the one case quoted being a man from a ship anchored in the bay. In June, 1907, many of the hospital corps and few patients began to bathe every afternoon off the hospital wharf and it was then that the cases quoted appeared; a few days later the men stopped going into the water, being deterred by the sufferings of the other men.

The symptoms, as noted, appeared in from ten minutes to an hour, but usually in from ten to fifteen minutes. In the nine cases quoted, one death occurred (case 8) that of a Filipino boy. I wrote to Dr. Kindleberger about the symptoms I had observed in the other cases here, but he replied that he noticed none of them in this boy except that he was badly frightened and hysterical.

Four cases (1, 2, 6, and 7), one of whom was a Filipino, had the marked hysterical symptoms, with the incessant cough, restlessness, pain, nausea, etc., and all presented about the same picture. This is the type of case to be recognized as caused by some unknown irritant or poison.

While some of the symptoms in cases 3, 4, 5, and 9 are like those in the type named, still the marked hysterical condition was not present and the latter is what would impress a physician most on reaching the bedside.

I have been stung many times by the jellyfish found abundantly in the waters of Chesapeake Bay, Virginia, called there "stinging nettles" and "blood-suckers," but beyond the local erythema and pain no other symptoms were noticed. From this experience, and considering the sufferings of some of the above quoted cases, I can not but believe that there is some absorbable substance present in the secretion of the fish concerned. The irritation of the mucous membrane of the mouth, throat, nose, and eyes, as seen in some cases and not in others, may be explained by the fact that some of the water around the fish which contained the cell secretion came into contact with these areas; and this might also explain the nausea and vomiting, but the severe general body pain suggests the possibility of an absorbable substance, as does also the case of death in which a depressing effect was noted.

The part which such a cause might play in drowning is also of interest aside from that of diagnosis. A person when stung generally strikes out for the shore or a boat, but should he be very far away from either, and symptoms of the severe type come on while he is still beyond his depth, I doubt if he would be able to reach the land safely.

The particular variety of jellyfish that causes these symptoms so far is unknown to me. I made inquiries among the fishermen along the shore near the hospital concerning the nature of this fish, but although they disagreed as to which variety caused the sting, they agreed that there was one which made a man sick when he was stung, and mentioned vomiting as one of the symptoms after the sting. Some said it was the red variety, which is the most common in the water thereabouts through the summer months; while others said the white variety was the factor. Several attempts were made by men at the hospital to produce these symptoms artificially by rubbing the fish, both the red and the white varieties, on their arms and legs, but with no result. I do not believe that the sting comes from the common variety, but from one less frequently seen. Some of the men said they were stung by the red fish, others by the white, but none of them waited to capture their tormentor.

I used some alkaline solution locally and morphine sulphate hypodermically for the treatment of such cases. The alkaline solution was employed on the basis that the irritant was of an acid type, as formic acid has been generally looked on as the agent in the different kinds of stings, including those of ants, bees, jellyfish, etc. As the patients seemed to suffer a great deal and were so anxious about their condition, morphine sulphate was resorted to.

I hope that should any such cases be seen during this coming summer by the members of the Philippine Islands Medical Association they will be able not only to locate the culpable variety of this particular kind of fish, but also be able to determine the nature of the irritant or poison secreted.

A MOSQUITO WHICH BREEDS IN SALT AND FRESH WATER.

By Charles S. Banks.

(From the Entomological Section, Biological Laboratory, Bureau of Science, Manila, P. I.)

INTRODUCTION.

The finding of members of a given species of animal breeding under such different conditions as those which obtain in fresh and salt water, especially where experiments have proved that a given lot of individuals when found in salt water and transferred to fresh for purposes of observation, have invariably died before reaching maturity, becomes a matter of the gravest economic importance; more particularly so when the question narrows itself down to the discovery of a pathophoric mosquito having such habits.

It was stated by me in a former publication[1] that while the majority of mosquitoes breed in fresh water, and while few are known to breed in the water of the sea, yet *Myzomyia ludlowii* Theob. is among this number. This form of mosquito has been proved to be a transmitter of malarial fever. The statement[2] was also made that this mosquito had never been found in these Islands breeding in fresh water; that as a result of transferring a large number of larvæ from sea to fresh water, all had died; and putting them into sea water at the point of saturation likewise killed them.

The interesting and crucial feature of this discussion develops as the result of a trip to the mountain Province of Lepanto-Bontoc to investigate an epidemic of malarial fever, said by the officials in that region to be of the most pernicious type.

Naturally, I expected to meet with another species of mosquito causing malaria in this isolated and elevated region, but instead I encountered adults of *M. ludlowii* Theob. in the dwellings during the first night of my stay in Cervantes, the capital of the province, and I was greatly astonished to find *their larvæ breeding in the greatest abundance in the rivers and small streams of the vicinity,* while a thorough search extending over two weeks and including the rice fields, which were flooded at this time of the year, the water tanks near buildings, the streams, the wells, and in fact all probable breeding places revealed no other species of *Anophelinæ*.

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[1] *This Journal, Sec. B.* (1907), 2, 513.

[2] *Loc. cit.*

GEOGRAPHY AND TOPOGRAPHY.

The town of Cervantes is situated near the center of the subprovince of Lepanto. It lies at an altitude of 508.8 meters upon a north-south hill 60 to 80 meters high between, and south of two forks of the Abra River. Each of these forks flows through a rather flat valley which favors the wandering of the streams from their habitual channels so that in reality from about 1 kilometer above the town to approximately a kilometer below there are, in the bed of each fork, four or five subparallel streams running more or less obliquely to the main course of the river as shown on Map 1. The entire river bed is covered with rocks of various sizes, some of which are sufficiently large to impede or change the course of the stream during the dry season.

The hill upon which Cervantes stands is composed of primitive rock of which the principal constituent is diorite with a more or less eroded, clayey, top soil. The base of this hill is cut into small, sharp gullies by the action of the water during the rainy season and in many of these gullies during the dry period there are springs, usually with a very small and slow flow. *Algæ,* upon which the mosquito larvæ feed, accumulate upon the wet rocks in these springs.

This entire valley lying between the *Cordillera Central* and the *Cordillera Occidental* has but one outlet to the sea, namely through Abra Pass, which is north of Cervantes. The mountains to the west average 1,000 meters in height while those to the south reach an elevation of 2,200 meters.

The town of Sagada lies 17 kilometers northeast of Cervantes at an altitude of 1,445 meters, on the east side of the *Cordillera Central* and in a region of limestone formation. A number of small streams and springs are found in its vicinity and some of these are subterranean.

Bontoc, 8.5 kilometers due east of Sagada, in the subprovince of Bontoc, has an altitude of 842 meters and lies on a slightly elevated bluff on the Anguinak River (*Baduyan* or *Cagayan*).

The valley through which the Anguinak flows in the region of Bontoc is narrow south and southwest of the town, but widens east of it, allowing the river to divide into several streams during the dry season, but during the rainy period making it a wide, impassable current. There are a number of islands in the stream below the town during the dry season, several of which are shown on Map 2, and one toward the northeast. These islands have practically the same formation as the ones in the inner bed at Cervantes and facilities of the same character, but in less degree, are offered for the breeding of *Myzomyia ludlowii* Theob.

CLIMATE AND TEMPERATURE.

The inhabitants of the region about Cervantes state that the temperature at that point, in the daytime during the dry season, is little if any lower than that of Manila, and certainly this was so during my stay there; the average day temperature was 30°, the night temperature 25°, which was even higher than in Manila. At Sagada the thermometer ranges at a very much lower point, while at Bontoc it is slightly lower than at Cervantes.

Cervantes is surrounded by hills on all sides except toward the north, and so the town is cooled only to a moderate degree, even during the monsoons, by the breezes which blow from that direction. The breezes become heated by passing through the valley from the northern extremity and find no outlet at the south; hence Cervantes during the dry season is subjected, as it were, to an almost continuous sirocco-like wind, which circulates and recirculates within the bowl-like valley.

This region, like others in the Philippines, is subject to occasional showers during the dry weather, but at Cervantes these are very infrequent.

CHARACTER OF THE RIVER AND SPRING WATER.

While the water in this region is strongly impregnated with lime, one of its peculiar features appears to be its large content of aluminium sulphate, which is also a characteristic of the water found in the breeding places of *Myzomyia ludlowii* Theob. at Olongapo. Many of the springs near Cervantes are hot and the water from these and the cold ones evaporating during the dry season, leaves an incrustation which when analyzed in the laboratory yields, approximately, 33 per cent of aluminium sulphate.

OBSERVATIONS ON MOSQUITO LARVÆ.[3]

The larvæ of *M. ludlowii* Theob., found in the Province of Lepanto-Bontoc, were always observed in water in which algæ were growing, either floating on the surface or attached to the stones over which the water trickled. This same fact was noted in a previous publication referring to the same species of mosquito at Olongapo. Those observed in streams from springs were most abundant where there were slight depressions in which water a half centimeter or more in depth might collect; in the rivers they were always encountered where an obstructing rock or the friction of the bank caused either a back current or an eddy and where the water was comparatively still. It was very difficult to discover the larvæ in such situations except during periods of the brightest sunshine and then only when, after disturbing the surface, the investigator patiently awaited their reappearance at the top. Any motion on the part of the observer, or a shadow caused by any object passing near, would send the full grown larvæ to the bottom, while the smaller ones would hide themselves in the entanglement of the *algæ*. The most practical way of obtaining the larvæ was to dip up *algæ* and water in a porcelain plate whereupon each larva, however minute, was at once thrown into silhouette against the white background.

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[3] *This Journal, Sec. B.* (1907), 2, 518.

No difference, either in general or in minute appearance could be observed, even upon microscopic examination, between these larvæ and the ones which breed in salt water. The breeding places were in every case exposed to the direct rays of the sun; often no vegetation was present within 10 or 15 meters of the streams. Culicine larvæ of a species not yet determined were associated with those of *Myzomyia ludlowii* Theob. This former species has been found breeding in open fields in the city of Manila in water containing algæ, but has never been seen in salt water at places on the sea where the larvæ of *M. ludlowii* Theob. have been encountered.

The mosquito larvæ were found breeding at Sagada and Bontoc under conditions identical with those at Cervantes, so that the question of altitude with reference to the influence upon the species appears not to enter into the discussion as to why these mosquitoes should be found thriving under such different environments.

DEDUCTIONS AND CONCLUSIONS.

I am not aware of any other record of a species of mosquito propagating naturally in both salt and fresh water. Previous laboratory experiments along this line made by me, both in America and in the tropics, have always demonstrated that mosquito larvæ removed from fresh to salt water or *vice versa,* have perished within a short time, either as a direct result of the difference in media or because of the effect of either fresh or salt water upon their food. No attempt has been made by me gradually to transfer *M. ludlowii* Theob. from salt to fresh water and it was likewise impossible at the time of my visit to Cervantes to bring living larvæ from there to the coast for experiment.

There are two theories which might be advanced to account for the different environments of *M. ludlowii* Theob. One is that the insects, originally salt-water breeders, have gradually been migrating by way of the Abra and Cagayan Rivers from the mouth of the latter up toward the higher regions, adapting themselves slowly first, to the brackish waters near the sea, then to the tidal fresh waters and finally extending up as far as Sagada and Cervantes.

The other and more natural deduction, in view of the fact that most mosquitoes are fresh-water breeders, would be that originally all mosquitoes breed in fresh water. This would appear the more reasonable since very many species breed in isolated water and in forests far inland.

If this was the case with *M. ludlowii* Theob., then the ease with which the larvæ might be carried by the river currents toward to sea would explain their present marine or littoral habitat.

HYGIENIC FEATURES.

The most important feature of this discovery from an economic standpoint appears to be its bearing upon the general dispersal of pernicious malaria in the Philippines. There would appear to be no barrier against it from the standpoint of geographical position, either in altitude or in remoteness from the sea. In fact, the demonstration of the parasites of æstivo-autumnal malaria in individuals who have never been out of the highland region, would be an accusation of overwhelming force against *M. ludlowii* Theob., which has already been shown to carry the same parasite at sea level.[4]

In Cervantes the crescent form of the parasite was found in the blood of a little girl, P. C., aged 6 years and 5 months who had been suffering from chills and fever for about two months previous to the time when I saw her. She had always lived in the town of Cervantes and therefore certainly contracted the disease locally and with *M. ludlowii* Theob. as the transmitting agent.

CONCLUSIONS.

The most obvious conclusions are:

That *Myzomyia ludlowii* Theob. is a species which, in the Philippines, breeds in both salt and fresh water.

That altitude has (up to 1,500 meters) no appreciable influence upon its development.

That there is little hope of ridding a community, like Cervantes, of this insect, owing to the peculiar topographical features which are practically irremediable because of their extent.

That the present investigation made in a region where *M. ludlowii* Theob. is found in great abundance and where no other anopheline was encountered, gives a strong additional proof of its rôle as a transmitter of *æstivo-autumnal* malaria.

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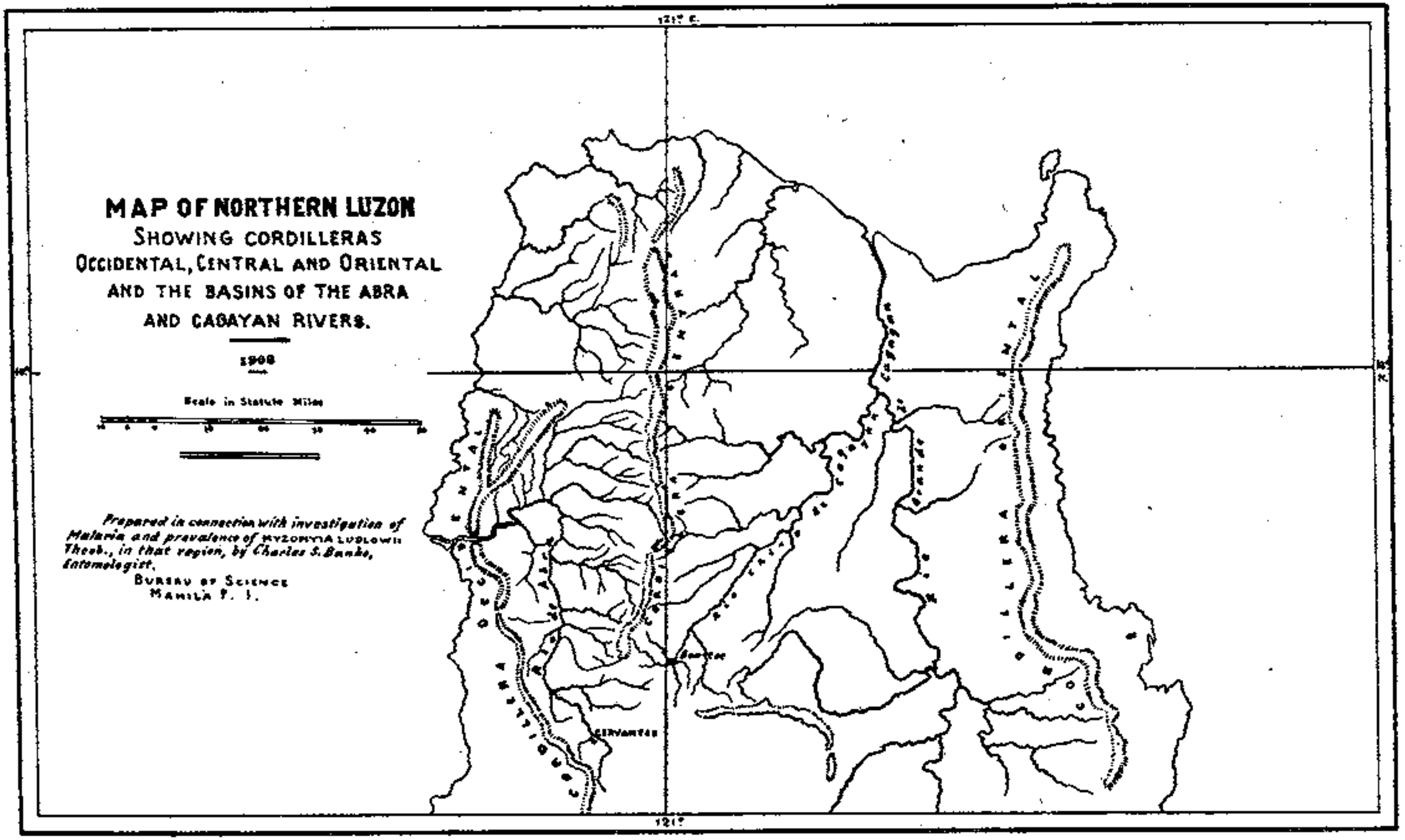
[4] *This Journal, Sec. B.* (1907), 2, 531 et seq.

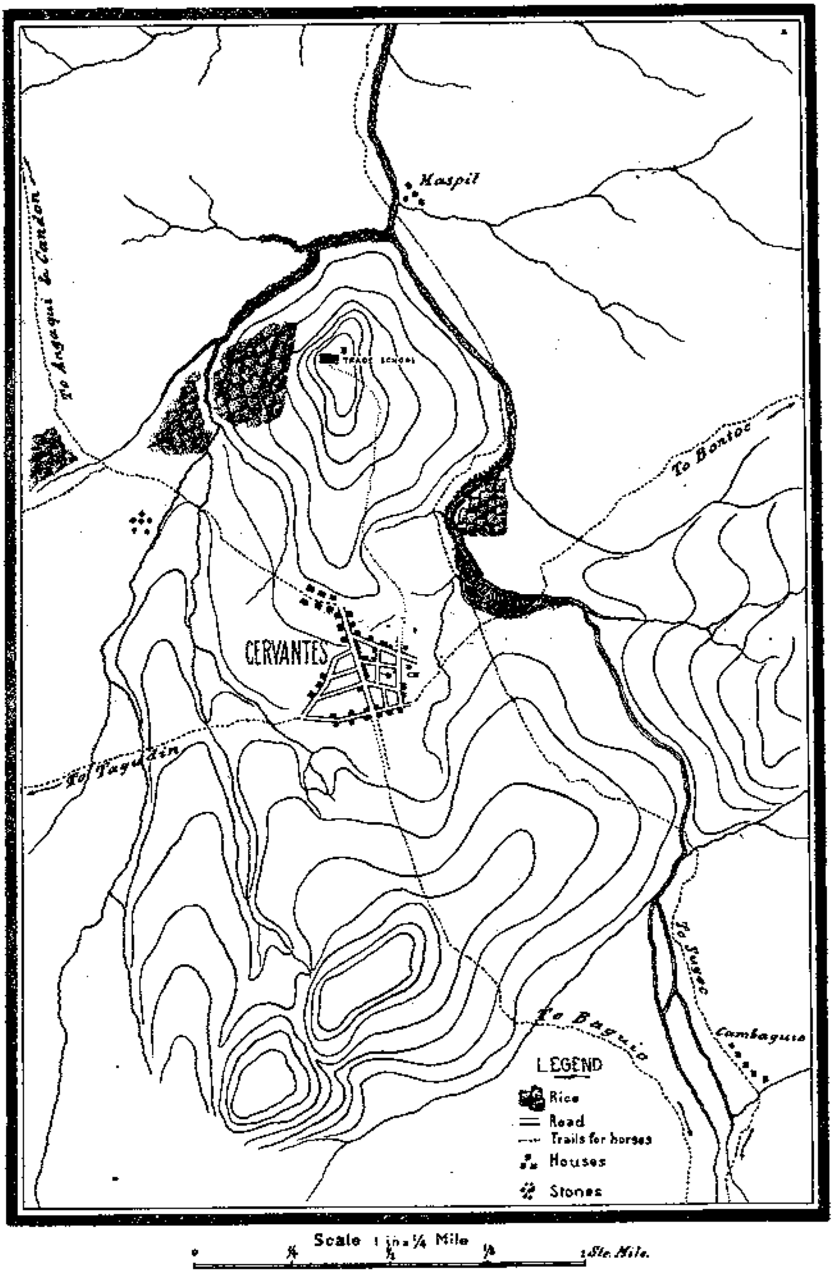
ILLUSTRATIONS.

MAP 1. Sketch of northern Luzon showing *Cordilleras Occidental* and *Central* with the courses of the Abra and Cagayan Chico Rivers.
2. Town of Cervantes and vicinity showing character of Abra River bed at this place.
3. Towns of Sagada and Bontoc, showing character of Cagayan River bed near Bontoc. Note the great width of the river south and northeast of Bontoc. In the dry season the river channel breaks up into a series of small streams which make ideal breeding places for *Myzomyia ludlowii* Theob. This condition is worse at Cervantes than at Bontoc.

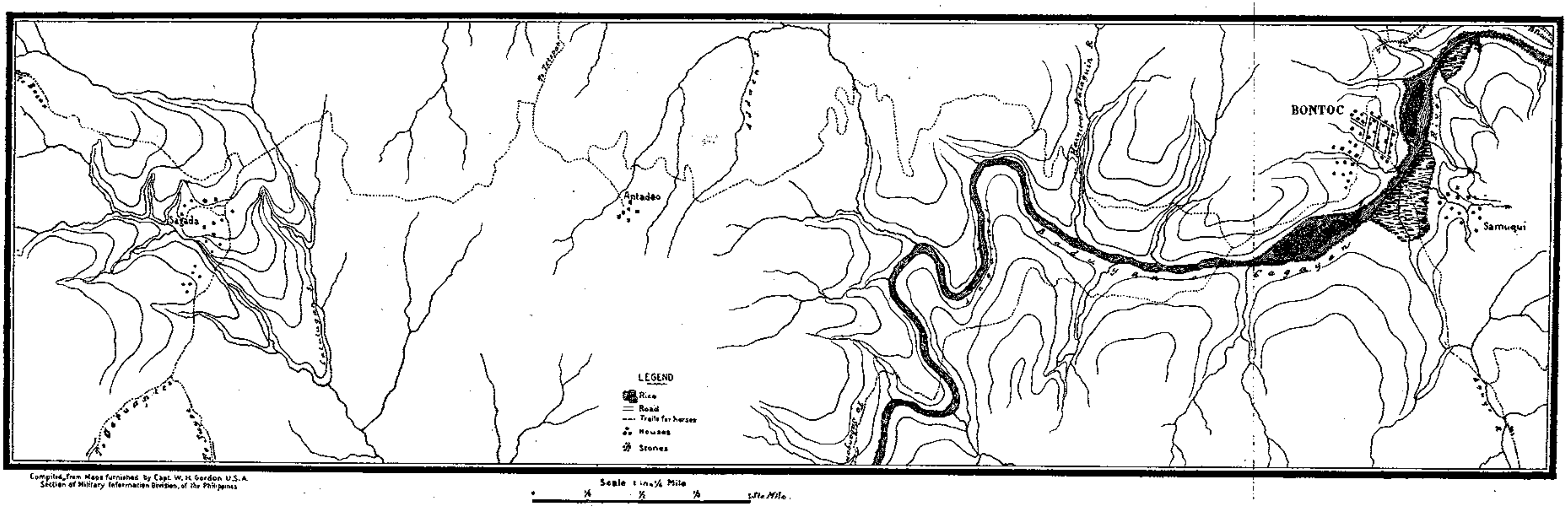
PLATE I. Dam in the Cagayan Chico River near Bontoc with a view of the island below it and the streams which traverse the island. Bontoc lies around behind the hill at the left.
II. Cagayan Chico River, showing a characteristic spot favorable to the breeding of mosquitoes. The Abra River at Cervantes is of the same type.


MAP OF NORTHERN LUZON
SHOWING CORDILLERAS
OCCIDENTAL, CENTRAL AND ORIENTAL
AND THE BASINS OF THE ABRA
AND CAGAYAN RIVERS.
1908
Scale in Statute Miles
Prepared in connection with investigation of Malaria and prevalence of MYZOMYIA LUDLOWII *Theob., in that region, by Charles S. Banks, Entomologist.*
BUREAU OF SCIENCE
MANILA P. I.
121° E.
121°
Bontoc
CERVANTES
Cagayan

BANKS: SALT AND FRESH WATER MOSQUITOES.] [PHIL. JOURN., SCI., VOL. III, NO. 4.



MAP OF CERVANTES, PROVINCE OF LEPANTO-BONTOC.



Compiled from Maps furnished by Capt. W. H. Gordon U.S.A.
Section of Military Information Division, of the Philippines

MAP OF SAGADA AND BONTOC, PROVINCE OF LEPANTO-BONTOC.

PLATE I.

PLATE II.

A CASE OF INFANTILE BERIBERI WITH AUTOPSY REPORT.[1]

By José Albert.[2]

The case under discussion is that of an infant three months of age, which was brought to my clinic at St. Paul's Hospital on the afternoon of December 3 last, and died during the next night. Upon examining the child, she was seen to be of robust frame. In general the face was pallid, but cyanosis was present around the mouth and nostrils. There was no rise of temperature; œdema of the legs and anterior chestwall was present; the urine was scanty; nausea was present, but not vomiting. From the previous afternoon until the time she was examined, two normal stools had been passed; the respirations numbered from 30 to 40, and the pulse 120 to 130 beats per minute. Pronounced aphonia was present, although the patient was constantly moaning.

The history of the case as given by the mother is as follows:

Two weeks previously the child lost her voice, as the result, so the mother thinks, of a bath. She vomited a good deal at this time and had frequent stools of a very dark color. It was these gastric and intestinal symptoms which caused the mother to bring her to the hospital.

Upon examining the mother, it was seen that she was suffering from a dropsical form of beriberi. There was œdema and swelling of the feet, the patellar reflexes were absent; there was a sensation of weight in the epigastrium; tachycardia was present. The mother said she had suffered from beriberi for a long time; she had besides the present child four other children of whom the first three, all of whom she had nursed, had died during the first months of infancy. The fourth child, immediately preceding the one whose case I am reporting, was not suckled, but had been brought up by the bottle, and is alive and in good health.

With the foregoing data there could be no doubt that the case was one of beriberi. As has already been mentioned above, the child died a little more than twenty-four hours later, and the autopsy and microscopical examination for the results of which I am indebted to Drs. Marshall and Gilman showed that the most important lesions were:

First, degeneration of both vagi and swelling of the cells of the right cervical ganglion; second, dilatation of the right side of the heart to a degree which threw it forward in contact with the sternum; third, collection of fluid in the pericardium; fourth, hæmorrhagic areas in both lungs; fifth, subcutaneous œdema in the legs and chestwall.

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[1] Read at the Fifth Annual Meeting of the Philippine Islands Medical Association, February 29, 1908.

[2] Professor of pediatrics in the Philippine Medical School.

As is seen, these lesions correspond exactly to those found in adults affected with the pernicious or cardiac form of beriberi, and the statement of Hirota, of Tokyo, to the effect that infantile beriberi is symptomatically and pathologically identical with the acute cardiac form in the adult is again born out.

The full report of the autopsy findings is as follows:

Autopsy.—Body of Filipina infant 56 centimeters long. Rigor mortis absent. Very little œdema of ankles. Slight œdema over chest. No œdema of face or hands. The subcutaneous fat is moderately abundant and firm. The peritoneal cavity is dry. The peritoneal surfaces are smooth and glistening. There is no injection along the vessels leading to the umbilicus. The diaphragm reaches the 4th space on the right side and to the fifth rib on the left. The thymus gland extends to a normal distance on top of the pericardium. There is a small amount of clear fluid in each pleural cavity.

Heart: The right auricle is considerably dilated; a post-mortem clot is found inside the right auricle. The tricuspid valves are normal. The left ventricle is small. The mitral valve and aortic valve are normal. The surface of the heart is pale; the muscle is firm. The length of the heart from the auriculo-ventricular groove to the apex is 4.5 centimeters. The walls of the left ventricle average 4 millimeters and of the right 4 millimeters in thickness. At the base of the aorta there are a few hæmorrhagic points beneath the pericardium, but no ecchymosis beneath the epicardium.

The *left lung* is moderately voluminous and shows few ecchymoses beneath the pleura. The color is mottled, pale, and red. The consistence, fairly firm. On section the lung is pale, uniform, and apparently normal. The hæmorrhagic points under the pleura correspond to small areas one-half millimeter in diameter extending into the substance of the lung.

The *right lung* is also moderately voluminous and shows a few hæmorrhagic points and in general resembles the left lung. On section it also appears normal. The lymph glands at the root of the lung also appear normal in size, consistence, and color. The omentum and mesentery contain very little fat. The contents of the duodenum is normal.

The *stomach* is small, contracted, and contains 5 cubic centimeters of thick, tenacious mucus mixed with a small amount of curded milk.

The *left kidney* measures 4 by 2 by 2 centimeters. The capsule strips readily, leaving a mottled surface. Post-mortem discolorations and traces of foetal lobulation are present. On section the cortex is dark brown and post-mortem change is evident. The structures are not clearly visible.

The *right kidney* measures 4 by 3 by 3 centimeters and presents the same general appearance as the left.

The *spleen* shows post-mortem change; it measures 5 by 3 by 2 centimeters. Its consistence is firm, the edges are sharp and the capsule smooth. On section the structures are clearly visible, the malpighian bodies being more conspicious than normal. The pulp is firm and dark.

The *left suprarenal* is apparently normal, being pale yellow in color. On section the cortex is seen as a yellow-white band, with a pale, dark color.

The *trachea, larynx*, and *bronchi* are clear.

The liver measures 12 by 7 by 4 centimeters. Its consistence is firm, the edges are sharp, the color is mottled. On section there is a pale yellow area near the surface while the general color is a brownish red and opaque.

Intestines: The mucous membrane is pale. There are swollen areas in Peyer's patches in the lower portion of the Ileum.

Histological examination by Dr. Gilman.—Microscopically the heart shows a diffuse, cloudy appearance with some separation of the muscle fiber and in places rather an abundant infiltration of round cells.

The lungs show a slight œdema with a few red blood cells free in the alveoli in various areas. The bronchial glands are normal. The kidneys show early post-mortem degeneration. The glomeruli are generally congested, the tufts being packed with red blood corpuscles.

The spleen shows a marked grade of congestion; the malpighian areas appear smaller than normal and are widely separated by the pulp, the sinuses of which are markedly engorged with red corpuscles.

The liver is markedly congested and the cells forming the periphery of the lobules show quite advanced fatty infiltration.

Both vagi show swelling of the fibers with complete degeneration of about one-half of the nerve; the remaining fibers stained poorly and showed in areas a slight round cell infiltration.

A section of the right cervical ganglion shows a general swelling of the nerve cells and their nuclei with an eccentric arrangement of the latter. A few of the cells show a granular change in the protoplasm.

I have been led to present this report since, with the confirmation by autopsy of this case of infantile beriberi, that nosological entity acquires definitely and indisputably, a rightful place in the pathology and statistics of infantile mortality in the Philippines.

The discovery of the existence of beriberi in nursing infants is due to Professor Hirota, of Tokyo, who first published, in the "Centralblatt für Innere Medizin," in 1898, his studies on this condition which he began in 1888. Before the publication of his studies, such eminent authors as Baelz and Scheube denied the existence of beriberi in nursing infants. Even at the present time, Scheube is not convinced that nurslings may acquire beriberi from their mothers through the milk.

It may be said that the recognition of the existence of infantile beriberi in the Philippines is of rather recent origin, since it is only four or five years ago, and due to Scheube's work on tropical diseases, that the observations of Hirota became accessible to the Filipino physicians, especially through Drs. Luis and Manuel Guerrero. But our clinical recognition was little more than a mere suspicion, as it had not been confirmed by a pathological demonstration on the cadaver as in the present case. Dr. Herzog, of the biological laboratory of the Bureau of Science, in Manila, who published in 1906 a most thorough research on beriberi, was not able to adduce a single autopsy on a case of beriberi in a nursing infant, undoubtedly because there had been no opportunity to perform one. He therefore limited himself to admitting the existence of infantile beriberi and citing the clinical testimony of the Filipino physicians.

How far infantile beriberi, acquired through nursing the mother, may or does increase mortality in the Philippines is a question to be reserved for the future. What may be confidently affirmed is that the best method of establishing a sound basis for the fight against infant mortality in the Philippines is to commence by revising the form of death certificate used for infants of less than one year in such a manner as to have a statement on the death certificate of each infant under one year of age dying in Manila, of the kind of nourishment which the infant has received during life, as is the practice in many other countries.

EDITORIAL.

DYSENTERIC ABSCESS OF THE LIVER.

The passing of abscess of the liver among Americans in the Philippines is so apparent from recent available statistics, that this most dreaded and most serious complication of intestinal amœbiasis should soon to a great extent lose its terrors, at least for Americans. During the interval from 1901 to 1905 the writer operated on about 100 cases of this form of abscess in both military and private practice, and 95 per cent at least of the patients were Americans; the percentage of recoveries was about 90 per cent. Exact data are not now available. The following operations were performed in St. Paul's Hospital, Manila.

Operations for amœbic abscess of the liver, St. Paul's Hospital, Manila.

Year.	Cases.	Americans.	Europeans.	Japanese.	Negroes.	Filipinos.
1905	9	5		3	1	
1906	8	2	2	1	1	2
1907	7	3				4
1908	2		1	1		
Total	26	10	3	5	2	6

The admission to the hospital of all classes of cases during this period was over 7,000.

A number of cases of liver abscess have been treated in the military and other hospitals of Manila during these years and a marked recent decrease of the disease among Americans is shown by the records of these institutions as far as could be learned. These figures prove in a most striking manner the efficacy of rational treatment of amœbic disease of the colon. But a short time ago, the discovery of amœbæ in their stools came as such a shock to sensitive patients that the overcoming of the dread and depression following the discovery of the parasites was no small part of the treatment.

During the interval of years from 1899 to 1903 the fear of amœbic dysentery in the American Army of occupation was so great that one amœba observed in a specimen of the stools of an officer or enlisted man was followed by an order for immediate transfer for treatment to the United States, where physicians knew even less about the disease than they did here, although the first two years of our occupation represented a period when every man was needed and no soldier was allowed to leave the Islands unless medical officers decided a return to be necessary in order to save life. Amœbic disease was regarded at that time as being practically incurable. That this was so is shown by a study of our best text-books of that period in which, although little space was devoted to the malady, a most gloomy picture of ten to twelve weeks' duration of the infection was drawn and the tendency to relapses and resulting chronicity and abscess of the liver was mentioned as the common sequence.[1] Thanks to the studies made of this disease and the rational methods in its treatment by Strong, Musgrave and Clegg and to the dissemination of knowledge, particularly among the laity, of the cause, methods of infections, prophylaxis, and curability of the infection, amœbiasis is now recognized at the onset even by the laity themselves, with the result that nowadays few amœbic patients lose any time from their duties. An intelligent person can learn in a few lessons how to take the necessary colonic injections, and taking a diet as heavy and stimulating as the digestive system can care for, instead of the starvation treatment, only periodical examinations of the stools can convince him that he still harbors amœbæ. Much of the general confidence in the profession's ability to cure the great majority of cases is strengthened by the fact that we now know that a considerable number of bowel disturbances due to amœbæ are mild in nature and recover with little and often with no treatment whatever.

The result of all this, as far as the liver abscess complication is concerned, is that this complication is now encountered only in neglected or improperly treated cases. Of course, a few generations will pass before the peoples of temperate climes will lose the widespread fear of abscess of the liver which they associate with a residence in the tropics.

A number of our colleagues in Far Eastern countries have given statistical reports which are of interest in this connection. Sir Allan Perry, principal medical officer of Colombo, Ceylon, sends us the following:

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[1] Osler (1897).

The General Hospital, Colombo—Cases of liver abscess, 1897–1906.

Year.	Number of cases.	Europeans (whites).	Natives.	History of dysentery and alcohol.	Amœbic.	Bacteria.	Number operated on.	Number died.
1897	5	[a]1	4	4	3	2	5	2
1898	11	4	7	8	8	3	11	4
1899[b]	12	5	7	7	7	5	12	6
1900	17	8	9	13	17	6	16	6
1901	9	3	6	7	5	4	9	1
1902	6	2	4	5	4	2	6	2
1903	18	10	8	14	13	5	18	9
1904	12	4	8	9	8	4	12	5
1905	30	16	14	18	18	12	30	10
1906	33	10	23	19	22	11	33	15
Total	153	63	90	104	99	54	152	60

[a] Among Europeans a very large proportion of the cases of liver abscess has been in French soldiers from Saigon homeward bound by reason of ill health.

[b] In 1899 one had history of trauma only; in 1905 two.

Dr. J. J. Vassal, of the Institut Pasteur, Nhatrang, Indo-China, gives us the following table from the service of Dr. Gaide, senior major surgeon of colonial troops, Hanoï, Tonquin, China:

Morbidity and mortality in patients by sanitary districts, in French Indo-China, after operation for suppurating hepatitis, in the years 1904, 1905. 1906, and 1907.

Sanitary districts.	1904.				1905.				1906.				1907.			
	Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.		Cases.		Deaths.	
	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.
Hanoï	24	3	7	0	18	2	4	0	19	1	10	1	26	1	9	0
Haiphong	5	0	2	0	11	0	5	0	8	0	5	0	1	0	3	0
Quang Yen	3	0	2	0	11	0	3	0	3	1	3	0	6	0	2	0
Coobang	1	1	0	0	1	0	1	0	0	0	0	0	1	0	1	0
Fort Bayard	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hagiang	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hué	1	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
Langsou	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lookay	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Moucay	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
Ghu Langthuong	0	0	0	0	4	1	1	1	2	0	2	0	1	1	1	0
Soutay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tourane	1	0	0	0	4	0	1	0	4	0	1	0	1	0	0	0
Tuyen Quang	2	2	0	2	0	1	0	0	0	0	0	0	0	0	0	0
Vietry	3	0	0	0	5	0	0	0	4	0	2	0	0	0	0	0
Yen Bay	1	0	0	0	0	0	0	0	2	0	1	0	0	1	0	0
Total	43	7	11	3	57	4	17	1	42	2	21	1	43	4	16	0
General total	50		14		61		18		44		25		47		16	

Dr. Vassal, in connection with the above table gives the following details furnished by Dr. Gaide, senior major surgeon of colonial troops, Hanoï, Tonquin.

> Although suppurating hepatitis is not rare at Hanoï, the greater part of the patients treated for this trouble at the military hospital of the city come from different parts of the upper country invalided for paludisine, dysentery, or some other trouble, hepatitis appearing only after their arrival at Hanoï, or they were sent because of this trouble by ambulance to the hospital at Hanoï, in order to be operated on under the most favorable conditions.
>
> In the course of the last four years the proportion of the mortality in every 100 patients treated has been as follows: 28 per cent in 1904; 29 per cent in 1905; 26 per cent in 1906; 34 per cent in 1907.
>
> The mean mortality per 100 patients treated, calculated for the four years indicated above, reaches the average of 41 in 100.

Dr. R. D. Keith, of the Straits and Federated Malay States Medical School, Singapore, Straits Settlements, has sent us the following table for Singapore:

Consecutive records examined, 1,564;[a] *dysentery present in 300 cases.*

Race.	Number of cases of dysentery.	Amœbiasis.	Abscess of the liver.[b] [c]
Chinese	270		14
Tamils	20		1
Malays	2		
Europeans	2		2
Other races	6		
Totals	300	194	17

[a] These members correspond to about 15,000 cases in the hospitals.

[b] The dysenteric condition in the seventeen cases was as follows: 6 advanced, 4 marked, 6 slight, 1 very slight. The small intestine was affected as well as the large in 4 out of the 17 cases.

[c] Single abscess occurred 5 times; multiple abscess 12, the right lobe alone was affected 11 times; the left lobe alone 1 time; both lobes were affected 5 times.

JOHN R. MCDILL.

THE FREE DISPENSARY OF THE PHILIPPINE MEDICAL SCHOOL.

The free dispensary of the Philippine Medical School was organized in September, 1907, the necessary rooms, pending the construction of the new building in connection with the Philippine General Hospital, having been furnished by the authorities of St. Paul's Hospital, Manila. This clinic, from the beginning, has been markedly popular with the people and has furnished abundant material for the purposes of instruction.

The attendance for the nine months, up to and including June 30, 1908, is given in the following table:

Month.	Medical.	Surgical.	Children.	Obstetrical.	Eye, ear, nose and throat.	Totals.
1907.						
September	492	236	73	2	19	822
October	575	254	43	1	101	974
November	587	281	56	1	155	1,080
December	508	286	70	1	160	1,025
1908.						
January	573	324	45	0	221	1,163
February	577	331	37	0	223	1,168
March	605	361	43	0	265	1,274
April	494	326	43	0	251	1,114
May	413	301	44	0	179	937
June	620	388	83	0	221	1,312
Totals	5,444	3,088	537	5	1,795	10.869

The months of July and August have shown even a greater number of patients and, with careful records, this clinic should in a short time furnish valuable data for a more extended study of the diseases existing among the poorer classes in Manila and the provinces.

PAUL C. FREER.

REVIEW.

Pharmacology: The Action and Uses of Drugs. By Maurice Vejux Tyrode, M. D. Cloth. Pp. ix + 255. Price, $1.50 net. Philadelphia: P. Blakiston's Son & Co., 1908.

It is to be presumed that this work is for the use of students of medicine and that consequently the author has endeavored to reduce the limits of the book so that it can be used for ready reference. In so doing he has omitted altogether the experimental side of pharmacology and so we are brought back to former times, when the knowledge of pharmacology possessed by beginning practitioners was based on the more or less positive statements of the text-books they had read and the lectures they had heard. It is our belief that the text-books of pharmacology for beginners should be so constructed as to include experimental work and at least general laboratory directions, that they should handle but few drugs, and these well chosen and that the topic of materia medica had best be reserved for a separate volume.

It is to be regretted, also, that the author has not included, so far as expedient and necessary, structural chemical formulæ. The mere name of a drug, even to those thoroughly conversant with the subject of pharmacology, often conveys no meaning, where the chemical formula does.

This book, however, is a short compendium which doubtless will find its place in the class room, although the student should be encouraged to do much collateral reading in connection with it.

P. C. F.

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(Concluded from second page of cover.)

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No. 33, 1905, Biological Laboratory.—Further Observations on Fibrin Thrombosis in the Glomerular and in Other Renal Vessels in Bubonic Plague. By Maximilian Herzog, M. D.

[1] *No. 34, 1905.*—I. Birds from Mindoro and Small Adjacent Islands. II. Notes on Three Rare Luzon Birds. By Richard C. McGregor.

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CONTENTS.

Page.

WASHBURN, WILLIAM S. Health conditions in the Philippines 269

ROGERS, LEONARD. The Prevention of Tropical Abscess of the Liver by the Early Diagnosis and Treatment of the Presuppurative Stage of Amœbic Hepatitis 285

PHALEN, JAMES M., and NICHOLS, HENRY J. Filariasis and Elephantiasis in Southern Luzon 293

PHALEN, JAMES M., and NICHOLS, HENRY J. Notes on the Distribution of Filaria Nocturna in the Philippine Islands 305

CASTELLANI, ALDO. Observations on a Palliative Treatment of Elephantiasis 311

RUEDIGER, E. H. Further Filtration Experiments with Virus of Cattle Plague 319

OLD, EDWARD H. H. A Report of Several Cases with Unusual Symptoms Caused by Contact with some Unknown Variety of Jelly-Fish (Scyphozoa) 329

BANKS, CHARLES S. A Mosquito which Breeds in Salt and Fresh Water 335

ALBERT, JOSÉ. A Case of Infantile Beriberi with Autopsy Report 345

EDITORIAL 349

REVIEW 355

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